

**INDUSTRIES ASSISTANCE
COMMISSION REPORT**

BRUCELLOSIS AND TUBERCULOSIS

10 April 1975

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COMMISSION REPORT

Brucellosis and Tuberculosis

Bovine Brucellosis and Tuberculosis Slaughter Compensation Scheme

10 April 1975

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BRUCELLOSIS AND TUBERCULOSIS

Table of Contents

	<u>Page No.</u>
1. SUMMARY	1
2. THE REFERENCE	5
Terms of reference	5
Interpretation of the reference	5
Public hearings	5
Structure of report	6
PART 1: BOVINE BRUCELLOSIS ERADICATION	
3. THE NATURE OF THE DISEASE, ITS EFFECTS, CONTROL AND ERADICATION PROCEDURES	7
Nature of brucellosis	7
Effect on cattle	7
Effect on humans	8
Economic effects	8
Export market restrictions	9
Control and eradication procedures	11
Vaccination	11
Test and slaughter	12
Facilities needed for control and eradication	14
Discounting	16
Wildlife and feral animals	16
4. BRUCELLOSIS ERADICATION SCHEMES	17
Eradication schemes in Australia	17
Progress prior to 1970	17
Progress since 1970	19
Financial arrangements	19
General progress	20
The timing of the eradication program	23
5. ANALYSIS OF BENEFITS AND COSTS	26
The New South Wales benefit-cost study	26
The Commission's benefit-cost study	27
Estimated expenditure for the next eight years	28

BRUCELLOSIS AND TUBERCULOSIS

	<u>Page No.</u>
6. RATIONALE FOR ASSISTANCE	31
Beneficiaries from eradication	31
Methods of raising producer contributions by the Australian Government	35
The inflexibility of the export charge	36
The incidence of the current beef export charge on the export sector	37
The taxation incidence between dairy and beef industries	39
Basis of compensation	40
7. CONCLUSIONS (BRUCELLOSIS)	42
Justification for eradication	42
Feasibility of eradication	43
Timing of the eradication program	44
Justification for Australian Government assistance	45
Allocation of cost	47
Method of funding	48
Slaughter compensation	48
Other eradication finance	49
Administration	50
PART 2: BOVINE TUBERCULOSIS ERADICATION	
8. THE NATURE OF THE DISEASE, ITS EFFECTS, CONTROL AND ERADICATION PROCEDURES	51
Nature of tuberculosis	51
Effect on cattle	51
Effect on humans	52
Economic effects	52
Control and eradication procedures	54
9. TUBERCULOSIS ERADICATION SCHEMES	57
Progress prior to 1970	57
Progress since 1970	58
Compensation funding	60
10. CONCLUSIONS (TUBERCULOSIS)	61
11. RECOMMENDATIONS	64

BRUCELLOSIS AND TUBERCULOSIS

APPENDICES

1. Terms of reference
2. List of witnesses
3. Suggestions
4. Suggestions on which the Commission has not directly commented
5. Compensation funds
6. Brucellosis eradication schemes overseas
7. Cattle movement regulations
8. Benefit-cost analyses description and tables

INDUSTRIES ASSISTANCE COMMISSION REPORT
BRUCELLOSIS AND TUBERCULOSIS
Bovine Brucellosis and Tuberculosis Slaughter Compensation Scheme

THE HONOURABLE THE SPECIAL MINISTER OF STATE

I am directed by the Commission to forward its report on "Brucellosis and Tuberculosis" made in accordance with the reference dated 11 March 1974 from the Prime Minister under Section 23 of the Industries Assistance Commission Act 1973.

I am also directed to indicate that the release of the report as soon as it is printed would not, in the view of the Commission, be likely to result in damaging speculation.

A.G. KERR
Acting Secretary

10 April 1975

For the purpose of the inquiry and report on this matter, in accordance with Section 19 of the Industries Assistance Commission Act 1973 the powers of the Commission have been exercised by:

C.W. CONRON.....Presiding Commissioner

HYLDA A. ROLFE.....Commissioner

BRUCELLOSIS AND TUBERCULOSIS

SECTION 1 SUMMARY

Brucellosis

Bovine brucellosis is a highly contagious disease causing abortion in cattle. The disease reduces productivity in the beef and dairy industries and is transmissible to humans. Evidence indicated that if brucellosis is not eradicated from Australian cattle there is a danger that imports of Australian beef and dairy products could be banned in other countries. The Commission considered that the main reason for attempting eradication is to avoid the economic and social disruption that a loss of export markets would have on beef and dairy producers, and resulting costs to the Australian community. On the basis of the evidence, and a benefit-cost study prepared by the Commission, the Commission concluded that eradication of brucellosis is justified.

The eradication of brucellosis usually involves the reduction of its prevalence by vaccination, followed by a test and slaughter program. The Commission concluded that such an eradication scheme is feasible and that compensation should be paid to producers for cattle which are found to be reactors and compulsorily slaughtered. For reasons of equity and to encourage progress in the eradication campaign, compensation should be based on market value of comparable but healthy animals.

Progress towards eradication varies considerably between States. Tasmania is virtually free of brucellosis and Western Australia has started a test and slaughter phase. Other States are still vaccinating but some are ready to commence test and slaughter. It seems necessary to achieve eradication about the same time as the United States of America achieves eradication. This is because the United States of America has generally imported a large proportion of Australia's export beef. There is also evidence that in the past, other importing countries have followed the lead of the United States of America in health requirements. That country plans to be free of brucellosis by 1983. The evidence indicated that for Australia to be "provisionally-free" of brucellosis by 1983, a compulsory slaughter program and an acceleration of existing testing programs would be required.

BRUCELLOSIS AND TUBERCULOSIS

The Commission concluded that the benefits of eradication would accrue largely to the beef and dairy industries and that any benefit to the community as a whole would be relatively small. However, the Commission considered there was a case for some Australian Government assistance. This was justified mainly because of the need for increased co-ordination and acceleration of the brucellosis eradication program and because of the potential cost to the taxpayer of the disruption to the beef and dairy industries which would occur if export markets were lost. Accordingly the Commission recommended that the Australian Government should provide financial assistance amounting to 75 per cent of the net compensation paid for brucellosis reactors. This is estimated to total \$26 m. at current prices for the years to 1983 or 15 per cent of the total cost of eradication. The remaining 25 per cent of the net compensation paid for brucellosis reactors should be provided by State Governments. The Commission considered that Australian Government assistance should only be given if plans to achieve "provisionally-free" status by 1983 are implemented.

The Commission considered that as beef and dairy producers are the principal beneficiaries from eradication they should bear the main share of the cost. It suggested that an Australian Government tax could continue to be imposed on producers as a means of raising part of the producers' share of eradication cost. Because it is important for the brucellosis eradication program to proceed without delay, the Commission considered that the Australian Government could also make available loan finance to assist with the relatively high costs occurring in the early years of an accelerated program. This would be repaid later from proceeds of the tax levied upon producers as part of their contribution. The Animal Health Committee of the Standing Committee on Agriculture should be responsible for allocating Australian Government loan finance and revenue from the producer tax between the States and Territories. State Governments should continue to be responsible for implementing the program.

Tuberculosis

Bovine tuberculosis causes wasting and death in cattle and is transmissible to humans. Its economic consequences are similar to those for brucellosis. The main economic consequence of failure to eradicate the disease would

BRUCELLOSIS AND TUBERCULOSIS

be the effect on the viability of producers following any disruption of export markets. There is no vaccine for the control of tuberculosis but reductions in prevalence from relatively high levels have been achieved by eradication campaigns. Complete eradication of tuberculosis requires a test and slaughter program.

Tasmania is free of bovine tuberculosis and Victoria and New South Wales are virtually 'provisionally-free'. Substantial progress towards eradication has been achieved in other States and Territories and relatively high prevalence levels remain only in the remote beef areas. The presence of buffaloes in part of the Northern Territory could jeopardise tuberculosis eradication there unless buffaloes are eliminated or controlled.

The Commission concluded that the Australian Government should make a financial contribution to the eradication of tuberculosis for the same reasons as those given for an Australian Government contribution to brucellosis eradication. However, because tuberculosis eradication is well advanced there is not the same urgency to undertake a massive program to accelerate progress towards eradication as in the case of brucellosis and the Commission recommended a lower level of assistance for tuberculosis eradication than for brucellosis eradication.

The Australian Government currently contributes \$50 per reactor towards the compensation cost for tuberculosis. This amount has been paid since July 1973 and is financed by the general taxpayer.

The Commission recommended that the Australian Government provide from consolidated revenue 50 per cent of the net compensation cost of tuberculosis reactors which are compulsorily slaughtered, with the States and producers sharing the remainder as at present. Assuming that a 50 per cent contribution averages \$50 per reactor the estimated cost of the proposal over the three years to 1977-78 would be about \$1.3 m.

BRUCELLOSIS AND TUBERCULOSIS

A proportionate contribution for compensation is considered to be preferable to the existing fixed amount of \$50 per slaughtered reactor because it would be more equitable with respect to producers' contributions towards the cost of compensation.

BRUCELLOSIS AND TUBERCULOSIS

SECTION 2 THE REFERENCETerms of reference

The terms of reference of this inquiry are included as Appendix 1.

The Commission was specifically requested to inquire into:

- the continuation of a compensation payment by the Australian Government after 31 December 1975 to owners of cattle which are found to be bovine tuberculosis reactors and slaughtered;
- whether similar assistance should be given to owners of cattle found to be bovine brucellosis reactors and slaughtered;
- the nature and extent of such assistance; and
- the period of time for which any recommended assistance should be provided.

The reference to the Commission was made under provisions of the Industries Assistance Commission Act 1973. This Act requires that Australian Government financial assistance which extends, or may extend, for more than two years, be referred to the Commission for inquiry and report. The Commission's report on this reference was required to be presented during April 1975.

Interpretation of the reference

In conducting its inquiry the Commission sought information and comment on all aspects of control and eradication of tuberculosis and brucellosis. This information was needed for the Commission to assess the importance of slaughter compensation in the context of the total eradication programs. The Commission has considered it appropriate to comment upon general issues relating to eradication.

Public hearings

The public hearings for this reference were held in Sydney on 30 September and 1-3 October 1974. Witnesses who gave evidence and the organisations they represented are listed in Appendix 2. Witnesses' suggestions relating to financial matters are summarised in Appendix 3. Appendix 4 summarises suggestions made by witnesses relating to matters on

BRUCELLOSIS AND TUBERCULOSIS

which the Commission has not commented. In some cases, lack of information has prevented Commission comment. Other suggestions in Appendix 4 are outside the terms of reference or relate to detailed matters of administration or veterinary opinion.

Structure of report

This report is in two main parts: Part 1 discusses brucellosis eradication and Part 2 tuberculosis eradication.

BRUCELLOSIS AND TUBERCULOSIS

PART 1 : BOVINE BRUCELLOSIS ERADICATIONSECTION 3 THE NATURE OF THE DISEASE, ITS EFFECTS, CONTROL AND ERADICATION PROCEDURESNature of brucellosis

The following details were supplied in public evidence by the Animal Health Committee on behalf of the Standing Committee on Agriculture.

Effect on cattle

"Bovine brucellosis is a highly contagious disease of cattle caused by infection with the bacterium *Brucella abortus*. Cattle become infected by ingestion of pasture, feed or water which has become contaminated by brucella organisms. Infection may occur by other means such as penetration of the skin, venereal infection, or contamination of the udder during milking, but these are of minor importance compared to ingestion.

The organism, on entering the body, localises in lymph nodes from which it may spread to the pregnant uterus, the udder, the testes, and joint capsules. In calves, infection may persist in the lymph nodes for a short time, but it is not usually permanent. In the sexually mature but non-pregnant female, localisation is usually in the udder, or the lymph nodes in the area of the uterus. Small numbers of brucella organisms escape into the blood stream from time to time. If the animal conceives, the organisms in the blood stream infect the pregnant uterus and this then becomes the major site of infection. Infection in the adult male is not normally transmitted unless the organisms localise in an area from which they are excreted in the semen. This can result in venereal infection, but is of limited relative importance.

The main clinical sign in bovine brucellosis is abortion. This is caused by the infection of the pregnant uterus including the placenta and the foetal membranes. Abortion due to infection by *Brucella abortus* typically does not occur until the last third of pregnancy. Cows which abort once usually do not abort at subsequent pregnancies, though occasionally up to three consecutive pregnancies may end in abortion."

BRUCELLOSIS AND TUBERCULOSIS

Effect on humans

"Humans may contract brucellosis due to *Brucella abortus* by contact with infected cattle or from contaminated products from these animals. Humans require a large infective dose of *Brucella abortus* organisms to contract brucellosis, and this in practice means that infection is contracted from contact with the animal (or its infective discharges). Brucellosis is therefore an occupational disease, with the main occupations at risk being veterinarians, farmers and, to a lesser extent, meatworkers. The main risk to veterinarians and farmers arises from the handling of infected cows at the time of calving when there are enormous numbers of organisms in the uterus, membranes and foetus. Infection may be by accidental ingestion from contaminated hands, accidental contamination of the eyes, penetration of the intact or abraded skin, breathing of infective aerosols or ingestion of contaminated foodstuffs.

Clinical brucellosis of humans, due to infection by *Brucella abortus* organisms, is not recognised as being a health problem of serious magnitude in Australia.... Individual cases of human brucellosis may be quite serious, but the incidence of these may be very greatly minimised by early diagnosis and treatment.

Acute infection is typified by fluctuating fever, profuse sweating, headaches and muscular pains. Chronic infection shows a great variety of symptoms, including intermittent bouts of fever, bone and joint changes, and various psychiatric changes.

In summary, the incidence of diagnosed clinical brucellosis in humans is low, but the disease can be exceedingly distressing when it does occur."

Economic effects

The economic effects of brucellosis are apparent in three main areas:

- . human health;
- . farm productivity; and
- . threatened loss of export markets.

Brucellosis in humans is mainly an occupational disease affecting veterinarians, farmers, meatworkers and others who are in frequent close contact with infected cattle or infected material. The Australian Department of Health provided data on the prevalence of human brucellosis in Australia.

BRUCELLOSIS AND TUBERCULOSIS

The number of cases reported in recent years has been relatively small at around 70, but witnesses indicated that brucellosis was difficult to diagnose and that some cases may not be reported. A breakdown, by source of infection, of 36 cases which occurred in Victoria in 1971 was provided by the New South Wales Department of Agriculture. Twelve cases were due to consumption of infected milk, 15 cases occurred in meatworkers and others working in infected premises, two were from self-inoculation and the source of the remaining seven cases was unknown.

The second principal economic effect of brucellosis is a decrease in productivity of resources employed in the cattle industries. A large proportion of brucellosis infected heifers abort and following abortion a temporary loss of milk production occurs. Some of these heifers may abort at subsequent pregnancies and some may become infertile. Infected bulls rarely transmit the disease but may become infertile.

The third effect of brucellosis is that most often quoted by witnesses. That is the possible loss of export markets for beef and veal in countries where the disease has been eradicated or where an eradication program is currently under way. It was claimed that such a loss, or a similar loss of dairy export markets, would have a drastic effect on the viability of producers, especially export producers, and would also be detrimental to the community. An example of this type of restriction is the exclusion from markets in the United States of America of beef from some South American countries because of quarantine requirements relating to foot and mouth disease.

Export market restrictions

One of Australia's major meat export markets has already legislated on the importation of meat from brucellosis diseased cattle and legislation for imported dairy products is foreshadowed. In the United States, local dairy products must by law be manufactured from milk produced in brucellosis-free areas or from "Modified - certified brucellosis areas".

BRUCELLOSIS AND TUBERCULOSIS

The latter term is applied to an area where no more than one per cent of cows and five per cent of herds are found to be infected during a testing period. The Australian Department of Agriculture stated in evidence that the intention in the United States of America was to extend this restriction to imported dairy products. A significant feature of this dairy restriction is that it is on an area rather than an animal basis. The current restrictions applying to meat imports are on an animal basis.

West Germany is the only country to have legislated against the importation of beef from diseased carcasses. Since 1966 all beef imports to that country have had to be from brucellosis-free cattle. The Australian Department of Agriculture indicated that the United States of America may introduce similar restrictions when brucellosis has been eradicated in that country. The Animal Health Committee indicated that the eradication target in the United States of America is now 1983. Witnesses argued that similar legislation might be implemented in a number of other countries, notably the United Kingdom, Canada and Japan. All of these countries have advanced programs for eradicating brucellosis and tuberculosis or alternatively, in the case of Japan, have very low prevalence* and incidence* of the disease. They are also important markets for Australia - taking more than 90 per cent of Australia's beef and veal exports in 1972-73.

Witnesses indicated that restrictions may be imposed on the importation of beef from infected cattle or, alternatively, the restrictions may apply to areas in which there are remnants of the disease. The restrictions currently imposed by West Germany apply to beef from cattle which are not officially certified as free from brucellosis or which have recorded a positive reaction to a test within 30 days prior to slaughter.

* Prevalence refers to the proportion of infected animals in the herd at a point of time. Incidence refers to the proportion of new infections occurring in one year.

BRUCELLOSIS AND TUBERCULOSIS

Restrictions imposed on an area basis could extend to a complete ban on the import of beef and veal from Australia. The loss and disruption to the Australian cattle industries which would follow from a total ban would be considerably greater than that expected should restrictions be imposed only on beef from infected cattle.

Control and eradication procedures*Vaccination*

Cattle cannot be cured of brucellosis. Thus eradication must consist of either removing infected animals from herds, or controlling the spread of infection from infected animals. In Australia, present veterinary practice favours the vaccination of cattle until prevalence is reduced to about two per cent. Because of the nature of the disease, continued vaccination would not reduce prevalence below that level. Compulsory test and slaughter would then commence.

Vaccination reduces the prevalence and incidence of brucellosis and suppresses abortion in those animals which do become infected. Witnesses stated that there was no necessity to vaccinate male calves, even though they are susceptible to the disease, because there is no resulting loss of production as in the case of female cattle and because there is little likelihood that male cattle will transmit the disease to female cattle.

Two vaccines for brucellosis are currently in use: Strain 19 and 45/20. Strain 19 is a live vaccine and should be administered by trained personnel since improper handling by untrained personnel may lead to infection in the user. Strain 19 accounted for 86 per cent of all vaccinations for brucellosis in Australia in 1973-74. Compared to 45/20, it is cheaper and needs to be administered only once. However, unless given to cattle before they reach the age of about eight months, Strain 19 can cause serious distortion to later diagnostic blood tests. In Western Australia and the Northern Territory only 45/20 (which is a "killed" vaccine) is permitted because it can be administered without regard to age. This is an important consideration in the extensive beef grazing areas where it is not physically

BRUCELLOSIS AND TUBERCULOSIS

possible to vaccinate all young heifers each year. Vaccine 45/20 has the further advantage for the Northern Territory in that it is not affected by climatic extremes.

For optimum results from 45/20, two doses are required initially, separated by a period of about six weeks, and should be supplemented by an annual booster injection. However, the Department of the Northern Territory stated in evidence that producers in the Northern Territory dispense with booster injections. The Department indicated that sufficient protection is provided by the initial dosages and that subsequent dosages complicate blood tests for brucellosis.

Brucellosis spreads among cattle mainly as a result of contact with brucella organisms which occur in profusion around aborted foetuses from infected cattle. One effect of vaccination is to reduce abortions considerably - and thereby the means by which the disease is spread.

Test and slaughter

A test and slaughter phase was generally agreed by witnesses to be necessary to remove final traces of the disease. In this phase, some form of systematic testing of herds is used to detect reactors which are then slaughtered. Evidence suggests that each property may need to be tested three or four times before it can be declared free of brucellosis. Near the end of the test and slaughter phase, when prevalence is low, it may be necessary (if an infected animal is found) to destroy the entire herd and to quarantine the property. This could facilitate the rapid removal of the remaining traces of infection.

The serological tests used to detect infected animals are subject to the occurrence of false negatives and false positives. A false negative is an infected animal which gives no positive reaction to the test. A false positive is a non-infected animal which gives a positive reaction. Because false negative reactions occur, repeated testing of herds is necessary.

BRUCELLOSIS AND TUBERCULOSIS

In evidence presented to the Commission there was general agreement that for a test and slaughter campaign to be successful, cattle which show a positive reaction must be compulsorily slaughtered. Progress under a voluntary scheme would be slow and eradication unlikely because producers would retain reactors until the normal age for culling. This delay in the removal of reactors would increase the risk of infection of clean animals. In Australia and overseas, attempts to eradicate the disease by voluntary slaughter have proven unsuccessful.

A test and slaughter phase of brucellosis eradication has been introduced in Tasmania, Western Australia and the protected areas of the Northern Territory (incorporating the Victoria River, Darwin, and Gulf areas and parts of the Central District). The slaughter of reactors is compulsory although in Western Australia subject to availability of finance and some witnesses argued that the low prevalence of brucellosis in these areas is due largely to the compulsory slaughter requirement.

Witnesses strongly favoured the payment of compensation for slaughtered reactors, mainly as an inducement to producers to comply with the eradication program. A submission from the Tasmanian Department of Agriculture emphasised the importance of gaining complete farmer support during the test and slaughter phase. In that State, farmer resistance resulted in the halting of the brucellosis eradication campaign in the mid 1950s and further hampered the scheme between 1962 and 1964. However, the submission noted that other equally vocal farmers were responsible for forcing a continuation of the brucellosis campaign in north-western Tasmania in 1958 after a Parliamentary Select Committee determined that continuation of the eradication scheme was not warranted. The Tasmanian Department of Agriculture stated that provision of a compensation scheme based on payment of market values for compulsorily slaughtered reactors was largely responsible for the success of its eradication program in terms of producer co-operation.

BRUCELLOSIS AND TUBERCULOSIS

In Western Australia, compensation for slaughtered reactors is also based on market value. In the protected areas of the Northern Territory, brucellosis reactors are compulsorily slaughtered but compensation is not paid. Despite this, witnesses pointed out that producers are co-operating in the eradication scheme. (Details of State compensation schemes are given in Appendix 5).

Compensation for slaughtered reactors is paid by governments in New Zealand, the United States of America (but not in Texas), Canada, Eire and the United Kingdom. In the Netherlands, the government and producers share the cost. Details of the nature of the brucellosis eradication programs and their progress in these countries were supplied by Dr. P.R. Harvey of the Animal Health Committee. A resume of these eradication schemes is given in Appendix 6.

Facilities needed for control and eradication

The speed with which an eradication campaign can proceed depends on the availability of personnel and facilities. On the farm, the principal requirements are labour for mustering and yards and crushes in which to handle cattle for vaccination and blood testing. In Western Australia, compensation for brucellosis reactors is only paid if the farmer has provided adequate cattle handling facilities. On the evidence presented, farm facilities may be inadequate in the extensive beef-grazing areas of Northern Australia. Nevertheless, witnesses contended that the lack of yards and labour would not seriously jeopardize the success of the campaign.

Laboratory facilities were considered by the State Government witnesses to be adequate for blood testing during the test and slaughter phase of eradication. However, the New South Wales Department of Agriculture indicated that the testing phase in that State could be more rapidly executed if capital grants from the Australian Government were obtained to complete five planned laboratories.

BRUCELLOSIS AND TUBERCULOSIS

State Governments and the Northern Territory Administration have power to regulate the inter- and intra-state movement of cattle. New South Wales, however, does not regulate movement of cattle to control brucellosis. Regulations differ slightly between the other States, but all aim to control the spread of brucellosis and other diseases. Cattle movement regulations are outlined in Appendix 7. In Queensland and South Australia there is limited control of intra-state movements. The Queensland Department of Primary Industries explained in evidence that restrictions on movement of brucellosis infected cattle have been prescribed and will be introduced when a test and slaughter campaign is commenced. The importance of adequate restrictions on the movement of cattle is supported by experience in the United States of America where it is reported that a breakdown in cattle movement regulations has been largely responsible for a recent setback in the brucellosis eradication campaign.

The success of a nation-wide test and slaughter campaign could be jeopardized if adequate slaughtering facilities were not available. Some Australian abattoirs are reluctant to accept brucellosis reactors. This is due to the need for segregation facilities, to hose reactors and structures, and to slow down the rate of processing in order to avoid contamination from infected organs. Some export abattoirs are particularly reluctant to handle brucellosis reactors for fear of jeopardizing their export licences.

As abattoir workers and meat inspectors are susceptible to brucellosis, their co-operation will be essential for the success of an eradication program. For the most part, this problem is still unresolved, although successful negotiations have taken place between workers and abattoir managements in Western Australia and in parts of other States.

In a test and slaughter program reactors will be identified. This should assist workers and management to use procedures which minimise the health risk.

A successful brucellosis eradication campaign also requires vaccine sufficient in both quantity and quality. Evidence from suppliers of brucellosis vaccines indicated that supplies of both Strain 19 and 45/20 vaccines would not limit the eradication program. Witnesses generally were satisfied with the quality of vaccine available.

BRUCELLOSIS AND TUBERCULOSIS

Discounting

Prices received by farmers for brucellosis reactors sent for slaughter have in many cases been below the prices paid for equivalent healthy animals. This occurs although the meat from brucellosis reactors is indistinguishable from that of healthy animals. The Animal Health Committee stated that a lower price was justified because of a restricted market for the meat and because additional costs are incurred by abattoirs in slaughtering reactors. However, the Committee believed that there was an element of unfair discounting. There was evidence that this type of discounting occurred in New South Wales, Queensland and the Northern Territory. The Australian Meat Exporters' Federal Council said it was not aware that unfair discounting occurs in any significant quantity.

The Animal Health Committee suggested, in evidence, that the price discounting problem may be overcome if State Departments of Agriculture were to acquire reactors, have them slaughtered at service abattoirs and subsequently sell the meat on the open market for domestic consumption. This procedure has been practised successfully in Tasmania and Western Australia. The New South Wales and the Victorian Departments of Agriculture were not able to indicate if such a scheme could operate successfully in their States, but the South Australian Department said that the scheme could possibly work.

Wildlife and Feral* Animals

The possibility of infection or re-infection of cattle from uncontrolled native wildlife and feral animals is not regarded as a significant threat to the eradication of brucellosis in Australia. There is no evidence of brucellosis in any Australian wildlife. Wild pigs and other feral animals are susceptible to brucellosis, but witnesses from the Australian Veterinary Association considered that they are unlikely to contribute directly to the infection of cattle. On the other hand, wild pigs and foxes can act as intermediaries in the transmission of brucellosis by dragging infected material into clean herds and into waterholes.

* Feral refers to previously domesticated animals, and their progeny, which have become wild.

BRUCELLOSIS AND TUBERCULOSIS

SECTION 4 BRUCELLOSIS ERADICATION SCHEMES

This section of the report outlines Australian schemes for the eradication of brucellosis prior and subsequent to 1970 when a nation-wide program was introduced to eradicate the disease. The section also discusses the timing of the eradication program.

Eradication schemes in Australia

At meetings of the Australian Agricultural Council in 1968 and 1969, the national Brucellosis and Tuberculosis Committee (a sub-committee of the Commonwealth and States Veterinary Committee*) proposed the implementation of a nation-wide campaign to eradicate bovine brucellosis and tuberculosis. It was successful in having such a scheme introduced in 1970. Previously, each State was responsible for implementing its own eradication programs for these diseases. Briefly, the current position is that Tasmania is considered brucellosis-free, Western Australia and parts of the Northern Territory are in the slaughtering stage and all other States are vaccinating.

Progress prior to 1970

Before 1970 there was little co-ordination between States and progress differed markedly. The greatest advances were made in Tasmania where the program to eradicate brucellosis began in the 1930s. At that time, vaccines were not available and control of brucellosis was attempted by herd accreditation. This procedure was an important feature of early efforts to eradicate brucellosis in Tasmania. It relied upon voluntary eradication by test and slaughter and was successful in areas where prevalence was initially low. Flinders Island was disease-free by 1938 and the north-east of Tasmania by 1945. However, eradication was difficult in areas where prevalence of brucellosis was high and relapses were frequent in herds which had achieved or were approaching accreditation.

* The Commonwealth and States Veterinary Committee is now known as the Animal Health Committee. The latter name is used to refer to the Committee throughout this report.

BRUCELLOSIS AND TUBERCULOSIS

The scheme was based on voluntary rather than compulsory participation and farmer co-operation was often difficult to achieve. This was especially so in high prevalence areas where farmers were reluctant to consent to the slaughter of a large proportion of their herds, even though compensation was paid for slaughtered reactors.

New South Wales, also, had relatively little success with herd accreditation. There were at most only 23 government herds, 22 private studs and five private grade herds within the scheme.

A greater degree of control was possible only after the development and introduction of vaccines from the early 1940s. Strain 19 was mainly responsible for reducing the prevalence in the Circular Head region of Tasmania from 12 per cent in 1950 to four per cent in 1961. On King Island the prevalence was reduced from 13 per cent in 1950 to 2.4 per cent in 1964.

There was no great effort to eradicate brucellosis in other states until the development of Strain 19. Its use was actively encouraged in all States, although in Queensland vaccination was concentrated in dairy areas prior to 1970. There was very little attempt to control brucellosis in the Northern Territory before the beginning of the nation-wide eradication scheme. Among the mainland States, greatest progress in eradication of brucellosis had been achieved in Western Australia. The Kimberley region is believed to be brucellosis-free, and elsewhere the prevalence and incidence of brucellosis had been reduced (through vaccination) by 1970 to a sufficiently low level to enable a test and slaughter campaign to be commenced in a large part of the State.

Prior to the commencement of the nation-wide brucellosis eradication campaign in 1970, all finance for the control of the disease was provided jointly by State Governments and producers except in Tasmania where the scheme was funded solely from State revenue.

BRUCELLOSIS AND TUBERCULOSIS

Progress since 1970*Financial arrangements*

In 1969, the Australian Agricultural Council agreed on the basis of financial contributions by Australian and State Governments to the foreshadowed national brucellosis and tuberculosis eradication campaign. The Australian Government agreed, for the triennium commencing 1969-70, to:

- . match the combined expenditure of the State Governments;
- . meet all expenditure in excess of \$50,000 for eradication in Tasmania; and
- . meet all costs in the Northern Territory.

The State Governments agreed to maintain their contributions at the 1968-69 levels but to increase them if possible. The Animal Health Committee was to administer the campaign and to allocate the Australian Government contribution between States.

For 1972-73, the first year of the next triennium, the principle of equal contributions by the Australian and State Governments was changed. In that year, the Australian Government agreed to make available \$3.6 m. and the States a total of \$2.1 m. The States indicated that it was likely they would increase their contributions by 10 per cent for 1973-74 and a further ten per cent for 1974-75. Projections of finance to be provided for future years anticipated further movement away from the equal contributions principle.

In the budget of 1973, the Australian Government introduced a levy of 0.6 cents per lb on all beef and veal exports to recoup the Australian Government's share of finance provided for eradication of brucellosis and tuberculosis from 1973-74. It was not intended to recoup its contribution for tuberculosis slaughter compensation. Apart from that, the levy was intended to recover all of the Australian Government's contribution over the three years from 1973-74. Because of the sharp decline in exports of meat from Australia the levy is now not expected fully to recover this expenditure. The Australian Government has made no announcement on this matter.

BRUCELLOSIS AND TUBERCULOSIS

General progress

With the additional finance available from 1970, new provisions designed to afford a greater degree of control of brucellosis were introduced. Surveys were undertaken to determine the regional prevalence of brucellosis and areas were classified according to the extent of infection. Where prevalence was found to be relatively high, a control area was declared and compulsory vaccination of all female calves was introduced. In Victoria the whole of the State was declared a control area, even though prevalence was generally low in all areas. In this case, compulsory vaccination was considered the best and least expensive method of holding the prevalence at low levels until sufficient finance and facilities were available to implement a program of test and slaughter. In Western Australia, by contrast, compulsory vaccination was considered inappropriate for areas of low infection and in such areas vaccination with 45/20 was carried out only in herds known to be infected.

Tasmania was virtually free of brucellosis by the end of 1973. Western Australia and part of the Northern Territory have proceeded beyond vaccination to the test and slaughter stage. New South Wales, Victoria and South Australia indicated in evidence that the prevalence of brucellosis in some areas of their States was low enough to begin a test and slaughter program. Details of prevalence levels are given later in this section.

All States (except New South Wales) and the Northern Territory have acted to protect brucellosis-free areas. The legislation differs slightly between States but usually requires that a health certificate be furnished with introduced cattle and that there be a negative reaction to a diagnostic test. Similar restrictions apply to intra-state cattle movements to free areas except in New South Wales, Queensland and South Australia. Effective administration of these controls by the State Departments of Agriculture is essential to prevent the spread of the disease, especially in areas where brucellosis has been eradicated as cattle in these areas become highly susceptible to infection.

BRUCELLOSIS AND TUBERCULOSIS

The success of cattle movement controls in isolating the disease in known areas of infection depends on the quality of the test on which the restrictions are based. Where movements of cattle into disease-free areas are authorised on the basis of a test which may yield a false negative, this inadvertently increases the risk of infection. This danger is illustrated by a Tasmanian example. In May 1973, infection was found in an area of Tasmania where there had been no infection for 14 years. The Tasmanian Department of Agriculture stated that it believed infection was introduced in a cow from Victoria, which had been tested in quarantine on several occasions without showing a reaction.

Evidence from the State Departments of Agriculture in Tasmania and Western Australia indicated that abattoir monitoring is an efficient method of surveillance once the prevalence in an area has been reduced. Under such a scheme, all cattle to be slaughtered carry a tail or back tag to identify the property of origin. Similar schemes currently operate in the Northern Territory and in all States, except in Queensland where the property of origin of diseased cattle is identified by cattle brands.

A feature of the test and slaughter program in Western Australia is a complementary scheme of certification and accreditation of herds free of brucellosis. This ensures a supply of registered disease-free herds from which stock replacements may be obtained. The Western Australian Department of Agriculture indicated that the scheme provides some incentive for registered disease-free herds, which were previously infected, to maintain precautions against re-infection. In that State another incentive for farmers to comply with the eradication program is the withholding of compensation unless there is producer co-operation in the program. Such co-operation is evidenced for the purposes of the legislation by the provision of on-farm facilities necessary to test cattle for brucellosis.

BRUCELLOSIS AND TUBERCULOSIS

Evidence from State Departments of Agriculture indicated that there are wide regional differences in prevalence within States (except Tasmania). In the Western Division of New South Wales the prevalence of brucellosis is well below one per cent while in the Moree watercourse area it is seven per cent. In New South Wales the average prevalence level is about two per cent. In the Australian Capital Territory prevalence is low. However, progress towards eradication in the Australian Capital Territory is related to progress in New South Wales because of unrestricted cattle movement between the two areas. The Victorian Department of Agriculture indicated that the prevalence in that State was in the range of nil to three per cent. In South Australia prevalence ranges from 0.4 per cent in some beef areas to three per cent in some dairy areas and the State average is 1.8 per cent. In the Northern Territory the average prevalence of brucellosis is less than two per cent but information on regional prevalences is not available. No comprehensive information on brucellosis prevalence in Western Australia or Queensland was given in evidence by witnesses from those States, although it was indicated that, in the former State, the prevalence is generally low. In Queensland, the prevalence of brucellosis is greater than two per cent along the eastern-coast and far western areas but in all other areas of the State the prevalence is below two per cent.

The Animal Health Committee supplied the Commission with estimates of the dates by which all mainland States and the Northern Territory are expected to achieve 'provisionally-free'* and 'free'* status. This information is summarised in the following table.

* For brucellosis, a 'provisionally-free' status is obtained when prevalence is reduced to 0.2 per cent. A 'free' status is obtained when there is no disease and no herds are in quarantine.

BRUCELLOSIS AND TUBERCULOSIS

ESTIMATED DATES ^(a) FOR ACHIEVEMENT OF PROVISIONALLY FREE
AND FREE STATUS FOR BRUCELLOSIS: BY STATE OR TERRITORY

State or Territory	Provisionally free status	Free status
Queensland	1985	1995
New South Wales	1980-82	1985-87 to 1990-92
Victoria	1980-81	1987-88
South Australia		
- Pastoral Area	1985	n.a.
- Non Pastoral Area	1981	n.a.
- Kangaroo Island	1975	n.a.
- West Coast, Cape York Peninsula, Mid North and Murray Mallee	1978	n.a.
Western Australia	1980	1985
Northern Territory	1980	1985

Source : Evidence.

(a) The basis for these estimates is that all finance necessary for eradication would be available and that there would be no difficulties at abattoirs in processing reactors.

n.a. not available.

The timing of the eradication program

Technical aspects of the eradication program, such as the rate and frequency of testing and testing methods affect the magnitudes of the benefits, compensation payments and other costs associated with the program. Dr R.S. Morris and Mr R.T. Roe of the Veterinary Preventive Medicine and Epidemiology Unit, Werribee, Victoria, provided detailed estimates from their epidemiological model on the costs of different eradication strategies. Their evidence suggests that where cattle numbers are expanding the cost of eradication will be higher if the commencement of test and slaughter is delayed until vaccination reduces prevalence to two per cent or less. This occurs because the additional cost of testing an increasing number of cattle tends to

BRUCELLOSIS AND TUBERCULOSIS

offset the savings in compensation costs achieved by the further use of Strain 19 vaccine to reduce prevalence levels. Conversely, in a contracting cattle industry, eradication costs are lowered by delaying the commencement of test and slaughter, since both testing and compensation costs fall as cattle numbers and the number of infected heifers decline.

An important consideration in the timing of any eradication program is the possibility of lowering total compensation payments by increasing the number of reactors slaughtered in times of depressed beef prices. This consideration is particularly relevant in the context of current low prices.

Where compensation is paid at full market value the total compensation payment will be equal to the difference between the on-farm value of an equivalent brucellosis-free animal and the market value of the carcass. Consequently, compensation payments will be sensitive to movements in the difference between breeder prices and slaughter prices. The critical question then is whether the difference is related to the level of prices. To answer this question the Commission analysed the movements in the difference between breeder¹ and slaughter prices at country market centres in New South Wales over the periods July 1959 to June 1963² and February 1973 to February 1975³. This analysis showed that breeder prices and slaughter prices moved closely together.

The difference in the prices remained fairly constant in times of falling prices. However, this differential decreased in the initial stage of increasing slaughter prices. As it was found that breeder prices

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- 1 An index of Hereford heifer prices, adjusted for quality change, was used as the index of breeder prices.
 - 2 Australian Meat Board Price Series for ox and/or heifer 650-700 lb first and second export quality at Homebush saleyard.
 - 3 Average price per pound for slaughtered heifers at selected country saleyards.

BRUCELLOSIS AND TUBERCULOSIS

lagged behind slaughter prices by approximately three months, the period when compensation payments would be lowest would be the three months after the initial upturn of slaughter prices. This time is, however, insufficient for any large saving in compensation costs. Accordingly, little would be gained by increasing the number of reactors slaughtered in times of depressed beef prices.

Morris and Roe recommended that the initial test of the national herd be completed as quickly as possible, preferably in the first three years of the test and slaughter phase of an eradication program. To accomplish this it may be necessary to test in the field as well as in the laboratory. Such field tests (Brewer Card and Rose Bengal Tests) are used in some Australian States, but the more accurate, though time consuming, laboratory tests are preferred by State Departments of Agriculture. The main disadvantage of field testing is loss of accuracy. However, in assessing the alternatives the loss of accuracy must be weighed against the rapid reduction in brucellosis prevalence which on the basis of the evidence would be possible by supplementing laboratory with field testing.

The evidence supplied to the Commission by the Animal Health Committee (set out in the earlier table) indicates that, except for Queensland and the pastoral area of South Australia, 'provisionally-free' status should be attained by the end of 1983. The other two areas should achieve that status by the end of 1985.

State Governments gave the Commission estimated numbers of tests to be carried out and estimates of reactors to these tests for the years until 1977 or 1978. The Commission analysed these data and considers that they are inconsistent with the eradication achievement target dates. It seems to the Commission that insufficient testing would be carried out to achieve 'provisionally-free' status by the dates indicated by the Animal Health Committee. This is explained in more detail in section 5.

BRUCELLOSIS AND TUBERCULOSIS

SECTION 5 ANALYSIS OF BENEFITS AND COSTS OF ERADICATION

Although individual State schemes for the eradication of brucellosis have been operating for many years, and a national scheme since 1 January 1970, only two submissions made any attempt to justify eradication in other than general terms. This, no doubt, reflects the fact that costs and benefits are difficult to quantify. However, the Commission believed that its assessment of the justification for eradication required an estimation of eradication benefits and costs, and has undertaken a study of the benefits and costs of eradicating brucellosis on a national basis. This study is reported in Appendix 8.

A submission by the New South Wales Department of Agriculture provided evidence on benefits and costs in New South Wales. Morris and Roe provided evidence on the costs of alternative eradication strategies (their evidence was discussed earlier in the report).

Many assumptions were necessary for the Commission's study, and the individual estimates of costs and benefits should be interpreted with some caution. However, the Commission believes that the overall results of the analysis provide a useful indication of the economic justification of a brucellosis eradication program.

The New South Wales benefit-cost study

The New South Wales Department of Agriculture commented that the benefit-cost study prepared for that State had not been refined to a high degree of accuracy, but that it was confident that the results provided a guide to the probable magnitude of the benefits and costs for the period to the year 2000. Its study was based on a compensation value of \$50 per slaughtered animal and appropriate estimates for vaccination and testing costs. Total eradication costs, using a discount rate of ten per cent per annum, were estimated at a present value of \$48.58 m. (for New South Wales). Of this amount, \$35.11 m. (72 per cent) would be borne by the State Government in providing laboratories, equipment and personnel.

BRUCELLOSIS AND TUBERCULOSIS

Producers' costs were estimated at \$5.42 m. (11 per cent) and included costs of farm facilities, mustering and quarantining and financial contributions to vaccination, blood testing, tail tagging, surveys, disease monitoring and Pastures Protection Board administration. Costs of compensation were estimated to be \$8.05 m., or 17 per cent of the total eradication cost.

The value of retained export markets for New South Wales beef producers was estimated to be \$434 m. This was the present value of export benefits accruing over 15 years from 1986, using a discount rate of ten per cent per annum. The benefit was nine times the estimated present value of costs. The value of lost export markets was assessed on the basis of the gross value of sales to those markets. The Commission considers that it may be better to assess the export loss as the difference between the gross export sales and the value of production which could be achieved from an alternative use of the same resources, or the value of those exports on alternative markets. The Commission believes the latter to be more appropriate because for many cattle producers in Australia cattle production will remain their most economic enterprise even at reduced prices for cattle products.

Benefits to human health and animal productivity were recognised in the study but only the beef export market benefit was quantified.

The Commission's benefit-cost study

The Commission's benefit-cost study, which was undertaken on an Australia-wide basis, supports the New South Wales Department's findings for that State. Both studies conclude that eradication of brucellosis is worthwhile, although a lower benefit-cost ratio was derived by the Commission's study. Costs of eradication are broadly similar in both studies and the lower ratio is due mainly to the inclusion of only the estimated value of alternative export markets in the Commission's study. In the latter study, it was assumed that failure to eradicate brucellosis would lead to the termination of exports (whether from infected or non-infected animals) to the United States of America. If bans applied only to products from infected animals, the benefits of retaining export markets would be substantially less than estimated.

BRUCELLOSIS AND TUBERCULOSIS

The Commission has estimated benefits and costs of eradication of brucellosis for the beef and dairy industries. Each industry has been defined on a commodity basis - that is, all cattle meats are assumed to be produced by the beef industry and all milk products by the dairy industry. Benefits and costs of eradication are shown in Table 2 of Appendix 8 together with a description of the assumptions underlying their estimation. A 30 year time horizon and ten per cent discount rate have been used. Export market benefits are assumed to accrue after eight years, and test and slaughter is assumed to commence in 1976 in all States and Territories.

The estimated benefits, in discounted net present values, are estimated by the Commission at \$79 m. for the dairy industry and \$599 m. for the beef industry. The major source of benefits is the retention of export markets which might otherwise be lost after 1983 because of the failure to achieve 'provisionally-free' status. Export benefits are 90 per cent of the total benefits to the beef and dairy industries combined.

Costs of test and slaughter, in discounted net present values, are estimated by the Commission at \$135 m. This includes \$24 m. for the dairy industry and almost \$111 m. for the beef industry.

The benefit-cost ratio for the test and slaughter phase in the beef industry is greater than unity for each State, and for Australia is over 5:1. For the dairy industry it is greater than 2:1 for each State and about 3:1 overall. When the two industries are considered together the resultant benefit-cost ratio is still greater than 5:1.

Estimated expenditure for the next eight years

In Table 3, the Commission has presented its assessment of cost for a program which would achieve 'provisionally-free' status in eight years. This assessment assumes that one third of the national herd is tested in each of the first three years. For an individual herd a testing program is taken to be three tests for all breeders in the first year plus a subsequent test for all breeders one year later. Later tests of all breeders in a herd could

BRUCELLOSIS AND TUBERCULOSIS

be undertaken as the monitoring system indicated the existence of a reactor within a particular herd. This is not ideal but is a compromise between testing the national herd in one year (which is clearly not feasible) and testing at a rate which would not achieve 'provisionally-free' status in eight years.

Table 4 provides estimates of future costs based on State Governments' projections of their future levels of activity. These estimates extended variously until 1977 or 1978. The projections provided by the States have been extrapolated by the Commission and the same unit costs used as in the Commission's other calculations. On the basis of the estimates provided, States with the most advanced programs (other than Tasmania) will not complete an initial testing of the entire herd on an area basis for at least eight to ten years, after which there will remain a period of at least five years while follow-up testing is carried out before 'provisionally-free' status is achieved.

The Commission's cost projections and those based on State projections may be compared, but because State estimates did not extend beyond 1978 care must be taken in drawing anything but broad implications from any comparison. Table 3 shows a rapid build-up of costs in early years and a notable tailing off in costs later. Table 4, by comparison, shows a much lower and less pronounced peak of costs. The total costs for the eight years are higher in Table 3 than in Table 4. These differences reflect the Commission's view that the rates of progress planned by the States are inadequate to achieve 'provisionally-free' status within eight years. Estimated compensation payments based on State projections are higher than those of the Commission. The main reason is that because of the nature of the disease it is expected that the slower the rate of progress towards eradication, the greater will be the number of reactors detected over the whole of the program.

The Commission's estimates (in Table 3) indicate that the total costs over eight years of an eradication program to achieve 'provisionally-free' status would be of the order of \$170 m. (in actual values at current prices). Of this, about 21 per cent would be borne by farmers in mustering

BRUCELLOSIS AND TUBERCULOSIS

and handling cattle on properties. Compensation costs account for about 21 per cent of the total, and the Government costs of testing and vaccination services account for about 53 per cent.

All categories of costs will continue after achievement of "provisionally-free" status although at a much reduced level. Estimates of these costs for the two years after achievement of "provisionally-free" status are also included in Table 3, and total \$3.7m.

The Commission has not been able to assess accurately the changes in benefits and costs which would result from a slowing or hastening of the proposed program. However, the evidence (particularly that of Morris and Roe) indicates that the cost will be greater the slower the program proceeds.

BRUCELLOSIS AND TUBERCULOSIS

SECTION 6 RATIONALE FOR ASSISTANCE

In its examination of the case for an Australian government contribution towards the eradication of brucellosis, the Commission was particularly concerned to identify which groups benefit from eradication. It seems reasonable that those groups which benefit should share in the cost of any eradication program. This section includes discussion of how that cost could be allocated. Particular attention is devoted to the determination of the amount of compensation to be paid to owners of compulsorily slaughtered cattle and to the manner in which producers in the beef and dairy industries may be taxed to provide for their financial contributions to the scheme.

Beneficiaries from eradication

Eradication will benefit mainly veterinarians, farmers and abattoir workers for whom brucellosis is an occupational disease. In 1973, there were 74 confirmed cases of brucellosis in Australia. The Commission estimates the costs of medication plus the loss of wages and salaries to be of the order of \$100,000 for that year. On this basis the economic cost of brucellosis in humans is not large and cannot in itself constitute grounds for a large contribution from the Australian taxpayer to the eradication program.

Eradication of brucellosis in Australia has important implications for productivity and for export earnings in the beef and dairy industries. These are two large industries in the Australian economy and important contributors to Australia's export earnings. The gross value of production of beef in Australia averaged about \$970 m. per year for the three years to 1973-74. Over the same period, the average annual value of beef exports was about \$560 m. representing about 60 per cent of production. During the three years to 1973-74 the average annual value of dairy production was \$470 m., and the average annual value of dairy exports was \$140 m. which was about 30 per cent of the value of dairy production.

BRUCELLOSIS AND TUBERCULOSIS

The eradication of brucellosis and the way in which the eradication program is financed may affect all involved in the production distribution and consumption of products of the beef and dairy industries. It is not necessary, however, to undertake a detailed investigation of the marketing chain for these industries in order to analyse the more important implications of brucellosis eradication. Consequently, the subsequent analysis is based on a division of the marketing chain into only two groups, producers and consumers.

The eradication of brucellosis would lead to increased productivity in the beef and dairy industries. Consumers would benefit from increased productivity to the extent that productivity gains were handed on to them as lower prices. Producers would benefit if livestock prices were reduced by less than the increased productivity that would occur. The extent of any sharing between consumers (lower prices) and producers (higher profit margins) of the benefits from increased productivity would be determined by the market.

In the beef market, variations in domestic prices are closely related to variations in overseas prices which are largely unaffected by changes in Australian supply conditions. Under these circumstances variations in productivity do not exert a large influence on livestock prices. Hence most of the productivity gains in the beef industry would probably not go to consumers in the form of lower prices but would accrue to beef producers as higher profits.

The marketing of dairy products in Australia is under the jurisdiction of the Australian Dairy Industry Council and, although cost increases were used to justify price increases in a recent hearing before the Prices Justification Tribunal, consumer prices in Australia have appeared, in the past, to be largely independent of domestic cost conditions. To the extent that consumer prices in the future are largely independent of domestic cost conditions, producers should largely acquire the benefits of increased productivity gains.

BRUCELLOSIS AND TUBERCULOSIS

The important question for the Commission, however, is not the allocation of productivity gains between producers and consumers in these industries but whether revenue collected from the general taxpayer should be used to finance a program to increase productivity when the benefits of that program predominantly accrue to the industries themselves.

The economic implications of the disruption caused by loss of export markets by failure to eradicate brucellosis would be far more important than the economic implications of increased productivity and improved human health. The Commission believes that failure to eradicate brucellosis could at some time in the future endanger a significant proportion, if not all, of Australia's export markets for beef and dairy products. If export markets were lost, the overall profitability of both industries would be reduced and substantial reconstruction would be likely. The costs of such reconstruction would be considerable and would include the costs associated with the re-deployment of human and other resources. By and large these are private costs which relate specifically to producers and those who work in the industry. However, in the past the Australian taxpayer has accepted responsibility for some of the costs of industry reconstruction on economic and social welfare grounds and to the extent that this will continue, the taxpayer has an interest in avoiding the disruption that would follow loss of major export markets.

The economic consequences of suddenly losing export markets are much wider than their effects on the export sector..

If some high priced beef export markets were lost, a proportion of export production would be diverted from export to domestic markets with the result that prices in the domestic market would fall. Consequently, a loss of some higher priced beef export markets would result in lower average prices to both domestic and export producers. Conversely, retained higher priced export markets would, in the longer term, lead to higher average prices to all producers. Any need for reconstruction therefore would not necessarily be confined to those producers who export beef.

BRUCELLOSIS AND TUBERCULOSIS

Domestic consumers of Australian beef may also be directly affected by any loss of export sales as a result of a failure to eradicate brucellosis. The diversion of export beef to the Australian market would probably lower domestic prices. This effect is likely to be particularly important in the period immediately following the loss of export markets. Hence with regard to beef prices, domestic consumers are disadvantaged by retained export markets and advantaged by loss of export markets.

The economic consequences of brucellosis eradication for producers in the dairy industry are very similar to those that would occur in the beef industry. If export markets were lost the total demand for Australian dairy products would fall and, as in the case of beef, this would lead to a need for reconstruction by producers for both export and domestic markets. The retention of export markets for dairy products therefore constitutes a benefit from eradication which would accrue to producers of these products and to the extent that reconstruction would be financed from general tax revenue, benefits would also accrue to the Australian taxpayer.

The extent to which domestic consumers of dairy products are affected by the loss of export markets would depend upon the pricing strategies of the authorities which set domestic prices. If consumer prices are largely independent of variations in export sales, as appears to have been the situation in the past, then the loss of export markets may not affect the price paid by domestic consumers of dairy products to any significant extent. However, the magnitude of the loss and consequent market diversion could do so.

A reduction of the scale of the beef and dairy industries may lead to less efficient use of existing facilities and higher costs for other industries. For example, transport costs may rise for other industries which are similarly located to the beef and dairy industries. However, the Commission has not specifically considered these possible effects on other industries in its analysis of the economic justification of brucellosis eradication.

BRUCELLOSIS AND TUBERCULOSIS

Finally, it is of the nature of the benefits and costs of brucellosis eradication that each producer and State has a direct interest in the action of other producers and States. The Commission recognises that incentives to producers and States may be necessary to ensure the utmost co-operation.

Unequal progress in eradication campaigns between States creates costs for the more progressive States in terms of quarantine and movement control, the more intensive monitoring required, the reduced access to breeding stocks, and the possibility of a blanket exclusion from export markets on an Australia-wide basis. An example of this problem is the recent Tasmanian experience (discussed earlier) of a brucellosis carrier imported from the mainland causing a renewed outbreak of the disease.

In the Commission's view, Australian Government intervention is justified to ensure that the efforts of some States are not jeopardised by the relative inactivity of others and because of the potential cost to the taxpayer of the disruption to the beef and dairy industries which would be caused if export markets were lost.

Methods of raising producer contributions by the Australian Government

Since November 1973 beef producers have been paying a charge of 0.6 cents per lb on beef exported as a contribution to the eradication of brucellosis and tuberculosis. Although representatives of beef producers believed that they should contribute to the eradication of brucellosis they were generally critical of the current beef export charge.

There were three common criticisms: the charge is inflexible, inequitable in its incidence on the export sector, and inequitable in its incidence on beef relative to dairying. These criticisms are each considered in the following paragraphs.

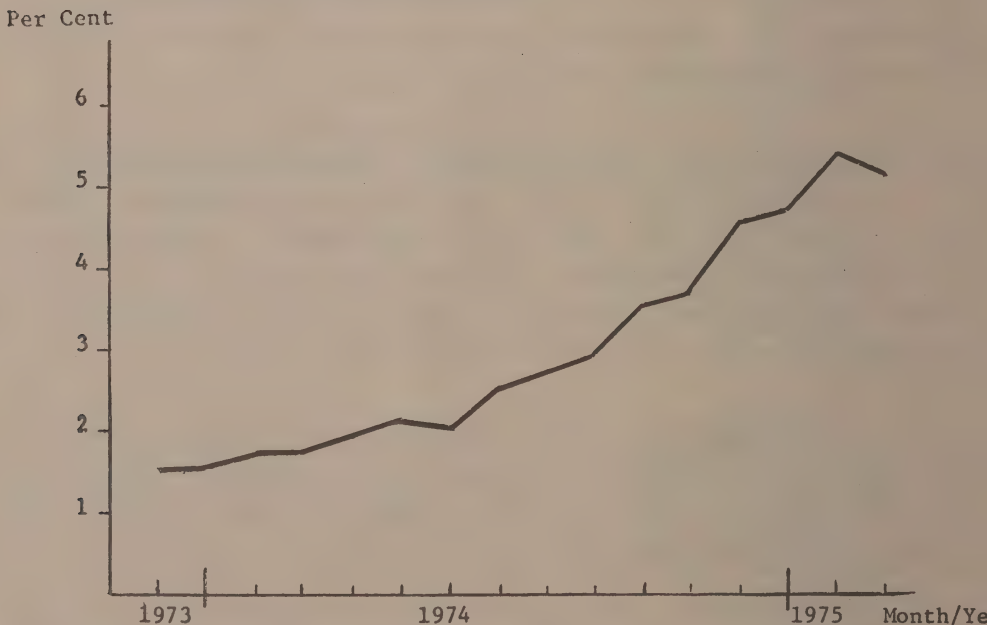
BRUCELLOSIS AND TUBERCULOSIS

The inflexibility of the export charge

The present beef export charge is not collected on an ad valorem basis and the Commission regards this as a disadvantage. Because the charge is specific the proportionate burden placed on producers increases during periods of low beef prices and reduces during periods of high prices. Consequently, as a proportion of the price, the charge increases during periods when the producer can afford it least. As price variations are closely associated with income variations from beef production the charge contributes to the instability of producer incomes.

The following figure provides an indication of the variations in the ad valorem equivalent of the beef export charge. The variations in the ad valorem equivalent are quite large for the type of export beef on which the figure is based, ranging from 1.5 per cent in November 1973 to 5.4 per cent in January 1975.

EXPORT CHARGE AS A PERCENTAGE OF ESTIMATED DRESSED
CARCASS VALUE* FOR EXPORT



*Meat Export Charge divided by the price per pound of ox and/or heifer, 650-700 lb., first and second export quality, Homebush Saleyard.

Source : Australian Meat Board.

BRUCELLOSIS AND TUBERCULOSIS

In these circumstances the Commission believes that an ad valorem tax would be preferable. Ad valorem taxes are better attuned to capacity to pay and hence more equitable between producers at a specific time, that is between those who sell high quality, high priced beef and those who sell low quality, low priced beef : and more equitable between one time period and another, that is, between periods of high prices and periods of low prices. Ad valorem taxes are more equitable also in that they probably better reflect the levels of benefits received which are more closely related to the value of export sales rather than the weight of meat exported. Further considerations which would be relevant are the administrative costs associated with each tax and the ease with which future tax revenue can be forecast. Information available to the Commission on these aspects, however, was insufficient to permit it to express any views on them.

The incidence of the current beef export charge on the export sector

A number of witnesses suggested that a different tax be substituted for the export charge. In the following section the economic effects of an export tax, and an alternative, a tax levied on all production, are examined. The analysis covers both the beef and dairy industries.

The economic effects of an export tax are not confined to buyers and sellers in export markets. Producers for the Australian market and domestic consumers are also affected. To the extent that variations in export prices lead to variations in domestic prices the imposition of an export tax will lead to lower prices received by beef producers for the Australian market and to lower prices paid by domestic consumers. The reason for this is that the introduction of an export tax will result in export producers receiving a lower net price for a given level of exports. Hence, if the links between the export and the domestic markets are strong, some of the beef that would previously have been exported will be diverted towards the home market with a resulting price fall in that market. Consequently, an export tax will result in lower prices received by

BRUCELLOSIS AND TUBERCULOSIS

producers in both markets. The magnitude of the price fall in the domestic market will depend on the size of the tax and the degree to which the export production can be redirected towards the domestic market.

Hence, the introduction of an export tax results in lower prices for consumers and lower prices for beef producers whether they supply the domestic or the export market. The lower price received from export sales is a result of a transfer of income from the beef exporter to the Australian Government and the lower price in the domestic market is a result of a transfer from the beef producer to the Australian consumer. Export charges therefore have as a consequence that, when domestic and export markets are closely linked, any transfer of income between exporters and the Australian Government leads to a parallel transfer between domestic producers and consumers.

The effects of an export charge may be compared and contrasted with a sales tax on the production of both industries. With regard to beef producers, a sales tax on all production set at the same level as an export tax will have the same effect on suppliers to the export market : export prices received by producers will fall by the amount of the tax. Domestic prices received by producers will also fall because the tax is being collected on all production. Whether a proportion of the tax is passed on to domestic consumers, in the form of higher prices, depends on the characteristics of the beef market. As the influence of export prices on domestic prices is strong the proportion of the tax passed on to consumers is likely to be small.

Consequently, for beef producers supplying either the export or domestic market there is little to choose between an export charge and a sales tax set at the same ad valorem level because each gives rise to similar price effects. However, if the purpose of the tax is to raise a given amount of revenue then a sales tax can be set at a lower ad valorem level than an export charge because the base to which the tax is applied is larger. The difference is quite significant. For example, the average per annum quantity of beef exported for the three years to 1973-74 was 492,000 tonnes. The export

BRUCELLOSIS AND TUBERCULOSIS

charge of 0.6 cents per lb if applied to this average would yield revenue of approximately \$6.5 m. per annum. Over the three years to 1973-74 the average annual production of beef in Australia was approximately 1,300,000 tonnes so that to raise \$6.5 m. per annum would require a charge on all sales of approximately 0.23 cents per lb, that is about one third of the rate of export charge.

Domestic consumers, however, in contrast to producers are advantaged by an export tax which leads to a diversion of some export supplies to the domestic market and hence lower domestic prices. A tax on all production does not divert a proportion of export supplies to the domestic market and consequently prices paid by domestic consumers are unlikely to be significantly affected.

In conclusion, the Commission does not consider that the current beef export charge is inequitably distributed between export and domestic producers. It does appear that the current beef export charge disadvantages beef producers more than a tax levied on all production set to raise the same revenue. However, whether an export charge should be regarded as inequitable on this basis must depend on a judgement as to the respective claims of producers who benefit from a production tax and consumers who benefit from a lower price consequent upon an export tax. The Commission has not directed its attention towards other considerations, such as the different levels of administrative costs which might be associated with each form of tax. This is a matter on which advice would be more appropriate from the relevant taxing authority.

The taxation incidence between dairy and beef industries

A number of witnesses criticised the beef export charge because of its incidence on the beef sector relative to the dairy sector. As the dairy sector is also threatened by loss of export markets, the Commission accepts the proposition that tax revenue should also be raised from that sector. An ad valorem tax on dairy exports or production would be appropriate.

BRUCELLOSIS AND TUBERCULOSIS

Irrespective of the tax chosen, the extension of the tax to the dairy industry should reduce the tax revenue to be raised from the beef industry to approximately 60 per cent of the level that would otherwise prevail. For example, the export charge of 0.6 cents per lb is equivalent to an ad valorem tax of 1.05 per cent on the average value of beef exported over the three years to 1973-74. To raise the same amount of revenue would have required a tax on all beef production of 0.61 per cent, or a tax on all beef and dairy production of 0.41 per cent.

The relative incidence of an export and a production tax on dairy products cannot be assessed independently of some judgement as to the way in which the dairy marketing authorities set prices. In the past, export prices and Australian consumer prices of dairy products have appeared to be independent of each other. In addition, Australian consumer prices appear to have been independent of domestic cost conditions. If these circumstances continue there would appear to be little difference between the two taxes for both producers and consumers. An export tax would cause export prices received by the dairy products equalisation fund to fall and as a result the equalised price received by all dairy producers would be lower. Prices paid by domestic consumers would be unaffected. A tax levied on all dairy production would result in a lower net price on domestic and export sales received by the equalisation fund and hence a lower price to all producers. Under these conditions a production tax would have the same effect on average prices to producers as an export tax set to raise the same revenue. The tax on all production would leave prices paid by domestic consumer unchanged and consequently domestic consumer prices would be unaffected by either tax.

Recent increases in the domestic price of butter and cheese granted by the Prices Justification Tribunal appear to have reflected increased production costs in the dairy industry. If cost increases were to continue to influence price increases, it is probable that a tax on dairy production, or a tax on dairy exports, would be passed on to the domestic consumer.

Basis of compensation

The Commission accepts that a test and slaughter program will be successful only if reactors are compulsorily slaughtered. The Commission believes that compensation at full market value (the on-farm value of an equivalent brucellosis-free animal, valued at the use to which the slaughtered

BRUCELLOSIS AND TUBERCULOSIS

animal was put) should be paid to the owners of compulsorily slaughtered cattle. Firstly, compensation reduces the costs to the owner and thereby promotes cooperation which is essential to the success of a program. Secondly, the nature of the disease is such that its incidence is largely random.

The Commission recognises that payment of compensation at full market value provides no penalty for farmers who fail to take adequate precautions to prevent the spreading of brucellosis. However, this is offset by the greater incentives provided to full co-operation by producers. (The Commission considers that State legislation should be enacted which requires co-operation by farmers - in cases where such legislation does not exist already.)

Where practicable, the reactor animal should be compulsorily acquired by the State and removed for slaughter. Under these arrangements the animal would be valued at farm-gate prices, with the State authority bearing responsibility for its transport, slaughter and sale. Adoption of such arrangements should overcome the unfair discounting of brucellosis reactors.

The Commission suggests that the present system of assessing market value, as used for example in Western Australia and Tasmania, should be adopted on an Australia-wide basis. Under this arrangement, if the producer and the district government officer cannot reach agreement, a final decision is made by a qualified independent third party.

In public evidence, some State Government representatives considered that a maximum value should be placed on the amount of compensation paid for individual brucellosis reactors. The purpose would be to exclude stud cattle from the compensation scheme. The Commission considers that stud cattle should be excluded from the scheme because of the difficulty of valuing such animals. In the Commission's view all registered stud animals should be directly excluded rather than indirectly excluded by the imposition of a maximum value for compensation.

BRUCELLOSIS AND TUBERCULOSIS

SECTION 7 CONCLUSIONS (BRUCELLOSIS)Justification for eradication

Three main reasons were put forward in evidence to justify efforts directed towards the eradication of brucellosis. These were that :

- . brucellosis is a human health hazard;
- . brucellosis causes loss of productivity in the beef and dairy industries; and
- . the continuing presence of brucellosis will endanger Australia's exports of cattle, meat and dairy products.

It was generally agreed that brucellosis as a human disease is mainly an occupational hazard associated with farming, veterinary practice and abattoir activity. However, members of the general community can also be infected with brucellosis. The disease can be extremely distressing and, in severe cases, can cause death.

Loss of productivity in beef and dairy industries, attributed to brucellosis, occurs through abortion, sterility and reduced output of meat and milk. These losses reduce farming efficiency. Productivity may be further reduced if adequate brucellosis control measures are not maintained as there is evidence that brucellosis would then increase to a high level of prevalence. The evidence suggested productivity losses of significant size but these were not quantified.

Evidence also suggested that control measures abroad could prevent the import of brucellosis contaminated cattle, meat or dairy products from Australia. The Commission considers that a ban on livestock imports may be justified because of the possibility of failure of diagnostic tests. While it seems reasonable to the Commission for countries which are eradicating brucellosis to be extremely cautious in preventing entry of products from diseased animals, a complete ban would seem unnecessary. Moreover, veterinarians stated in evidence that there was only a minimal health risk associated with the consumption of beef from infected cattle, since the disease is localised in those parts of the animal not usually eaten. Dairy products

BRUCELLOSIS AND TUBERCULOSIS

made from pasteurised milk present no health risk due to brucellosis. If a complete ban on imports of Australian beef and dairy products were applied in certain countries, the underlying reasons would be, in the Commission's view, for other than health reasons.

It is by no means clear that bans would be applied to Australia's exports, but the Commission considers that the risks are too great to ignore. The loss of export markets would cause considerable disruption and hardship to both beef producers and dairy farmers. It is mainly on this basis that the Commission believes an eradication program can be economically justified.

Feasibility of eradication

Complete eradication of brucellosis is very difficult, particularly in the final stages, but the evidence suggests that it is technically possible. Facilities needed for the test and slaughter phase are laboratories, diagnostic personnel (veterinary, technical and administrative) and various on-farm facilities such as holding yards and crushes. Although witnesses pointed out some inadequacy of farm facilities, they believed that in general these facilities would be adequate.

The co-operation of abattoirs is essential for effective implementation of the slaughter phase of eradication. Some export abattoirs are particularly reluctant to process brucellosis reactors because of the possibility of loss of their export licences if provisions to contain the spread of brucella organisms prove inadequate. (Spillage from removed infected organs could contaminate meat from healthy animals intended for export). Many non-export meatworks, however, have agreed to process brucellosis reactors. If there are insufficient abattoirs to handle diseased animals, cattle may have to be slaughtered on the owner's property under appropriate supervision. The carcass value would then be lost and net compensation payments from the compensation funds may be substantially increased. In certain circumstances, it may be

BRUCELLOSIS AND TUBERCULOSIS

more economic to slaughter reactors on the property. This should not invalidate payment of compensation at full market value.

The evidence indicated that reactors are unfairly discounted. Some price discounting is justified to offset the additional costs that abattoirs incur in handling and marketing reactors. However, very high rates of discounting would place pressure on compensation funds and are unnecessary since the meat from brucellosis reactor cattle may be sold on the domestic market at the same price as that from comparable, but healthy, animals.

Abattoir workers in some States have objected to handling brucellosis reactors because of the possibility of infection, although under the test and slaughter program reactors will be clearly identified. Discussions between workers and abattoir managements are proceeding and some progress has been made, but the problem will need to be resolved before an effective test and slaughter program can be implemented.

The co-operation of producers is obviously required for effective eradication of brucellosis. Tasmanian experience suggests that every effort should be made to ensure farmer involvement and participation. Compensation at full market value would, in the Commission's opinion, assist in encouraging co-operation from farmers.

Timing of the eradication program

The Commission considers that it is necessary to achieve eradication about the same time as the United States of America. This is because the United States of America has generally imported, and should continue to do so, a large proportion of Australia's export beef. There is also evidence that, in the past, countries have followed the lead of the United States of America in health requirements. Target dates provided to the Commission by the Animal Health Committee indicate that most of Australia would be 'provisionally-free' of brucellosis by 1983, the target date for the United States of America eradication program.

BRUCELLOSIS AND TUBERCULOSIS

However, in the Commission's view, target dates for achieving 'provisionally-free' status and estimates of actual activity are inconsistent, and on the latter basis eradication would not be achieved by 1983. The Commission considers that programs should be revised so that 'provisionally-free' status can be achieved throughout Australia by the end of 1983. In a situation where cattle numbers are increasing, such an accelerated program would be cheaper than a slower program.

Justification for Australian Government assistance

Witnesses presented several arguments to justify Australian Government financial assistance for brucellosis control and eradication:

- . that the community generally would benefit through
 - improved health; and
 - increased productivity in beef and dairying;
- . that the community generally would benefit through retained export markets;
- . that eradication assistance would be an appropriate means of providing tariff compensatory assistance to beef and dairy producers;
- . that assistance would safeguard progress made to date and act as an incentive for producers and State Governments to continue eradication.

Each of these arguments is discussed below.

The eradication of brucellosis would lead to improved community health. However, the number of reported brucellosis cases is quite small, 74 in 1973, the disease occurring largely within the industry itself. The Commission has not been able to gather any estimate of the number of confirmed and unconfirmed cases of human brucellosis occurring outside the industry, but believes this to be relatively small. In the Commission's view, community health cannot of itself justify a significant contribution by the general taxpayer to the eradication of brucellosis.

BRUCELLOSIS AND TUBERCULOSIS

The Commission recognises the value of improved productivity in the industries concerned. However, the benefits flowing from improved productivity would accrue to the producers and consumers of the products of these industries and particularly to the producers (see section 6). The important question, for the Commission, is whether the general taxpayer should contribute resources to improve productivity when the benefits of that improvement are largely confined to the producers and consumers of the products of the industries. Under these circumstances the Commission does not believe a contribution should be made from the general taxpayer.

The Commission does not accept the argument that the Australian Government should finance brucellosis eradication as a means of providing tariff compensation to beef and dairy producers. In the Commission's view the overall level of assistance received by the beef and dairy industries relative to that received by other industries is not a central issue in this report. The Commission's attitude to tariff compensation is developed in its Annual Report for 1973-74* where it is stated that

"If there are certain economic or social reasons for changing the present structure of assistance the particular changes made should be determined by these reasons rather than by the need to compensate for defects in the present structure of assistance".

In the Commission's view Australian Government financial support for the eradication of brucellosis can be justified for specific economic and social reasons and assistance for the eradication of brucellosis should be given on these grounds rather than on any need to compensate the beef and dairy industries for any adverse effects of the present tariff structure.

The major economic reason for the eradication of brucellosis is that eradication will enable export markets to be retained. Loss of export markets would necessitate substantial reconstruction of the beef and dairy industries, part of the cost of which would probably have to be borne by the Australian taxpayer.

* Industries Assistance Commission, Annual Report 1973-74, Appendix 5, Page 111.

BRUCELLOSIS AND TUBERCULOSIS

Furthermore, it is of the nature of the benefits and costs of brucellosis eradication that each producer and State has a direct interest in the action of other producers and States. Non eradication by one State creates costs for other States in terms of quarantine and movement control, the more intensive monitoring required, the reduced access to breeding stocks, and the possibility of a blanket exclusion from export markets on an Australia-wide basis.

The Commission accepts the argument that assistance would safeguard progress made to date and act as an incentive for producers and State Governments to continue eradication. The Commission is also of the view that Australian export markets may be jeopardised because some States appear to be making inadequate progress and therefore the possibility arises that other States may suffer because of this. Financial and other assistance by the Australian Government should contribute to the increased co-ordination and acceleration of the program that is required.

In summary, although the major benefits of eradication accrue to producers, the Commission believes that there is a case for some assistance from the Australian Government.

Allocation of cost

Although it is not possible to quantify the benefit to be derived by the general community, it is small in relation to benefits gained by producers. The Australian Government's share of cost should be consistent with the benefits to the community.

State Governments have general responsibility for the oversight and fostering of rural industry and a continuing interest in its well-being. These Governments traditionally provide the general regulatory service and extension facilities for rural industry. In the case of animal disease control, State Government contributions also include livestock movement and compensation legislation, laboratory and testing services, and personnel and

BRUCELLOSIS AND TUBERCULOSIS

the services of district officers and advisers. In some States a contribution to cattle disease compensation funds is made from State revenue. All State Departments of Agriculture indicated, in evidence, that finance is a constraint on their planned eradication programs. The Commission accepts this view but considers that State Governments should continue to contribute to eradication expenditure because of their responsibility for rural industry and for implementation of the eradication program.

The Commission considers that as producers are the principal beneficiaries from eradication they should bear the main share of the eradication cost. The Commission acknowledges that producers bear costs associated with the provision of on-farm facilities and the disruption of the farm working schedule, but believes that producers should also make an explicit financial contribution. Organisations giving evidence on behalf of producers accepted that producers should contribute financially to the brucellosis eradication program.

Method of funding*Slaughter compensation*

The Commission will recommend that 75 per cent of net compensation cost (i.e. the difference between full market value, as defined in section 6, and carcass value) for reactors compulsorily slaughtered be paid as a grant from consolidated revenue by the Australian Government. This contribution (estimated at \$26m.) would represent 15 per cent of the estimated total actual cost at present prices of a eight-year eradication program. The remaining 25 per cent of net compensation cost should, in the Commission's view, be borne by State Governments. As State and Territory Governments are expected to be responsible for administration of the compensation arrangements, it is important that they should be responsible for raising part of the finance required. As explained in section 6, the Commission considers that stud cattle should be excluded from the compensation scheme.

The annual contribution of the Australian Government would be high in the early years of the program, when cattle testing will be intense and large numbers of reactors slaughtered. In the final stages of the program the Australian Government's contribution would be relatively low.

BRUCELLOSIS AND TUBERCULOSIS

As explained earlier the Commission considers that it is essential for Australia-wide 'provisionally-free' status to be achieved by the end of 1983 to minimise the chances of any loss of export markets. For this reason, the Commission considers that the provision of Australian Government finance should be subject to such a program being drawn up and implemented and that this finance should be provided for the period of the agreed program to achieve 'provisionally-free' status by the end of 1983.

The Australian Government should secure the agreement of State Governments that compensation should be based on full market value (as defined in section 6). If unfair discounting of brucellosis reactors were to occur on a wide scale, the size of the Australian Government's contribution to compensation would be increased substantially. For this reason, the Australian Government before making finance available, should ensure that all possible steps have been taken to overcome this problem.

Other eradication finance

The Commission's recommendations are confined to the slaughter compensation questions addressed to it in the terms of reference for the inquiry. This section of the report sets out the Commission's suggestions on other finance for the program.

The Commission considers that State Governments should continue their commitment to increase their share of expenditure by at least ten per cent each year. The Australian Government should provide a share of general finance required for eradication in the Territories.

Producers of beef and dairy products should, in the Commission's view, provide the remaining finance required for eradication.

The Commission considers that the producers' share of finance should be raised by an appropriate Australian Government tax. (The question of taxing was discussed in section 6). A tax on producers may seem inequitable in States that become free of brucellosis in the early years of the program. However, the Commission considers that in those States the cost of maintaining disease free status should be met from the tax revenue.

BRUCELLOSIS AND TUBERCULOSIS

Under the Commission's suggestion for an accelerated program, a large proportion of cost will be incurred in the early years (see Table 3 of Appendix 8). As the tax on producers could not be expected to cover this high expenditure it is suggested that the Australian Government should make loan finance available (at appropriate interest rates) to meet these humps in expenditure. The money would be provided through the Animal Health Committee but would be repaid with interest in later years from the producers' tax. In making this suggestion, the Commission has assumed that it would be possible to work out a suitable financial arrangement but recognises that the details of such an arrangement require further consideration.

Administration

Witnesses generally agreed that control of planning and financing for the eradication program should remain with the Animal Health Committee of the Standing Committee on Agriculture. The Commission concurs with this view. It suggests that the Animal Health Committee plan for achievement of "provisionally-free" status by the end of 1983. The Committee should keep abreast of progress overseas towards eradication and revise Australian plans if necessary. The Committee should be responsible for allocating Australian Government loan finance and revenue from the producer tax between the States and Territories. State Governments should continue to be responsible for implementing the program.

There was some comment in the evidence regarding the establishment of the Bureau of Animal Health: the Commission has no basis for comment upon any role that this Bureau could have in the brucellosis and tuberculosis eradication program.

BRUCELLOSIS AND TUBERCULOSIS

PART 2 : BOVINE TUBERCULOSIS ERADICATIONSECTION 8 THE NATURE OF THE DISEASE, ITS EFFECTS, CONTROL AND ERADICATION
PROCEDURES

This section of the report deals with the epidemiology of tuberculosis, describes its economic effects and outlines the procedures for controlling and eradicating the disease.

Nature of tuberculosis

The following descriptive information is an extract from the public evidence of the Animal Health Committee of the Standing Committee on Agriculture.

Effect on cattle

"Bovine tuberculosis is a contagious disease of cattle caused by infection of the animal by tuberculosis organisms. There are a number of varieties of tuberculosis, all of which may infect cattle. Infection of cattle by other than the bovine variety is relatively uncommon. The bovine tuberculosis eradication campaign is aimed at the eradication from the Australian herd of tuberculosis caused by the bovine variety of the tuberculosis organism.

Infection of the animal is primarily by means of inhalation of infective droplets or ingestion of pasture, feed or water contaminated by the excretion (sputum, faeces) of an infected beast. A suckling animal may be infected by ingestion of milk in which tuberculosis organisms are excreted.

Upon gaining entry into the animal, the organisms localise mainly in the lymphatic nodes, but also in other major organs, particularly the lungs. The reaction of the animal's tissues to the infection results in the formation of abscesses. These may cause variable clinical signs, depending on the site of localisation and the degree of development of the abscess. Tuberculosis is a chronic disease, and the long term release of toxic substances from the site of infection causes weakness, wasting and eventual death. The major economic effects of bovine tuberculosis are:

- (a) death and failure to thrive of affected animals;
- (b) condemnations at abattoir inspections; and
- (c) rejection from export of carcasses which have shown evidence of infection but been passed as fit for human consumption."

BRUCELLOSIS AND TUBERCULOSIS

Effect on humans

"Humans may contract tuberculosis from cattle by contact with infective droplets or by drinking milk in which tuberculosis organisms have been excreted. Droplet infection requires very close contact between man and animal and is of negligible importance in Australia. In the past, infection of children by tuberculosis of bovine origin was relatively frequent. It has virtually been eliminated by the universal pasteurisation of milk. Humans may also contract skin tuberculosis from immediate contact with infective bovine tissues. This condition is an occupational disease which is infrequently seen in Australia."

Economic effects

Intensive efforts to eradicate tuberculosis have been undertaken in some States for more than two decades. As a result, the prevalence of the disease in most areas of Australia has been reduced considerably. The extent of the economic loss from the presence of tuberculosis in Australian cattle is closely related to the prevalence and, accordingly, will be minor in those areas where the disease is virtually eradicated. However, there still remain some pockets of infection where the loss resulting from tuberculosis is relatively high.

The economic effects of bovine tuberculosis are similar to those already outlined for brucellosis and include the following:

- . human infection;
- . loss of production; and
- . loss of export markets.

Most witnesses emphasised the zoonosis of tuberculosis, that is, the possibility of transmission to humans, as a result of either consuming infected products or handling infected animals. Based on this possibility, a relatively early start to tuberculosis eradication was made. The bovine strain of tuberculosis in humans was especially prevalent in some urban areas of Western Australia in the late 1940's. At that time in Perth and Kalgoorlie, it was necessary to install special hospital wards to treat tuberculosis in children.

BRUCELLOSIS AND TUBERCULOSIS

It is not possible to estimate, from the evidence, the extent of the economic loss associated with tuberculosis in humans, but with pasteurisation of milk such loss now would be small. Infection of humans by tuberculosis from unpasteurised milk is possible, at present, only from infected house cows, or in the Northern Territory where milk may be sold unpasteurised. The high cost of pasteurisation plants for small settlements was given in evidence as the reason for not enforcing pasteurisation of milk in the Territory.

Witnesses emphasized the effect that loss of exports as a result of bovine tuberculosis would have on beef and dairy producers. Of greatest relevance, in this regard, is the prohibition imposed by the United States of America in February 1972, on imports of beef from animals which show any evidence of tuberculosis, either as a test reactor or at the slaughter inspection stage. In response to this restriction, the Australian Government announced in May 1972 that all exports of meat to any country from any known reactors or from tuberculosis infected animals would be prohibited. Also, United States of America restrictions are foreshadowed on dairy products which are manufactured from milk from cattle in areas with relatively high tuberculosis prevalence. It was suggested, in evidence, that these restrictions would adversely affect the viability of the Australian beef and dairy industries. Witnesses suggested that as eradication proceeds overseas, a complete ban may be applied on imports of Australian beef and dairy products if tuberculosis persists in this country.

The final important economic effect of tuberculosis is the lower production from diseased animals. Infected cattle fail to thrive, waste away and eventually die. They have a lower milk yield, and beef carcasses inspected after slaughter may be condemned in part or in whole depending on the extent of the disease. Thus, witnesses argued that eradication of tuberculosis results in an increase in productivity and, in herds that are free of the disease, average costs of production are lower than in diseased herds.

BRUCELLOSIS AND TUBERCULOSIS

Control and eradication procedures

As in the case of brucellosis, cattle infected with tuberculosis cannot be cured. But whereas there are effective vaccines for the control of brucellosis, no similar vaccines are available for tuberculosis. Control of tuberculosis can be achieved only by adopting a 'two herd' scheme or by a test and slaughter program or a combination of both these practices. The "two herd" scheme involves the weaning and segregation of calves from their mothers and concentration of testing for tuberculosis on the weaners. Calves that are found to be free of the disease are kept separate and their numbers are gradually increased to form a tuberculosis-free herd. Considerable success has been reported for this system as a means of reducing the prevalence from relatively high levels, especially in extensive grazing areas.

The evidence suggests that while a 'two herd' scheme can reduce the prevalence of tuberculosis substantially, it cannot effect complete eradication. Further reduction in prevalence can be achieved only by a test and slaughter program. The Australian procedure is to inject cattle with a small amount of tuberculin. The injection site is examined, by touch and sight, 72 to 96 hours later. A positive reactor is identified by a lump on the injection site. In all States (but not in the whole of the Northern Territory) reactors are compulsorily slaughtered, although in Victoria the proven presence of a considerable proportion of false positive reactors led the Victorian Department of Agriculture to modify the compulsory provisions. After 1964 reactors were not slaughtered in Victoria unless this was considered warranted by the history of the herd in which reactors were identified, or there were obvious clinical manifestations of the disease, or a repeat test confirmed the presence of infection.

In some States the identification of reactors is assisted by a trace-back monitoring system in abattoirs. This system complements a routine testing program, although in Western Australia trace-back is the main system for identifying infected herds.

BRUCELLOSIS AND TUBERCULOSIS

Export abattoirs need to take particular precautions when slaughtering tuberculosis reactors in order to safeguard export licences. For this reason, many export abattoirs have been reluctant to slaughter reactors.

For the reasons outlined in Part 1 on brucellosis, it has been considered necessary to slaughter reactors compulsorily once a tuberculosis protected area has been declared and routine testing begun. Witnesses strongly supported the payment of compensation to owners of cattle compulsorily slaughtered. This was justified on the basis that considerable losses are incurred where a large number of reactors are taken from one property, and that compensation is necessary to obtain farmer co-operation during the test and slaughter phase.

The influence of Australian wildlife and feral animals on eradication of tuberculosis is more important than in the case of brucellosis. The danger is that these animals, largely uncontrolled, can spread initial infection and also re-infect clean herds. As in the case of brucellosis, there is no evidence to suggest that Australian wildlife can directly spread bovine tuberculosis. Although opossums have been found with lesions of tuberculosis in New Zealand, infected opossums are unknown in Australia. The greatest danger to cattle from feral animals is from pigs and buffaloes and is largely confined to the Northern Territory. Evidence from the New South Wales Department of Agriculture indicated that pigs in that State are not likely to spread tuberculosis to cattle. A similar view was expressed by the Department of the Northern Territory regarding cross-infection of tuberculosis between cattle and wild pigs in the Territory. Most infections are likely to be one way, as a result of pigs eating infected carcasses. Wild buffaloes in the Northern Territory were considered more likely than pigs to infect cattle with tuberculosis. Representatives of the Department of the Northern Territory indicated that commercial buffalo farming is feasible and would remove the danger of infection to cattle. However, there is very little such farming at present. They stated that probably buffaloes would have to be eradicated before tuberculosis eradication could be achieved in the Northern Territory. However, they added that

BRUCELLOSIS AND TUBERCULOSIS

buffaloes are confined to the sub-coastal areas, a relatively small part of the Territory. The Commonwealth Scientific and Industrial Research Organisation also referred to the need to **control** all buffaloes in the Northern Territory if the campaign to eradicate tuberculosis is to succeed.

BRUCELLOSIS AND TUBERCULOSIS

SECTION 9 TUBERCULOSIS ERADICATION SCHEMES

This section of the report outlines progress towards eradication of tuberculosis both prior to and following the commencement of the nationwide scheme to eradicate brucellosis and tuberculosis in 1970.

Progress prior to 1970

Attempts to control tuberculosis have been undertaken in all States for several decades. Efforts were initially concentrated on dairy herds because of the high risk of human infection from milk consumed. Considerable progress towards eradication was achieved in dairy herds in all States up to 1970. For example, the Queensland Department of Primary Industries submitted in evidence that "... by 1969 the disease had been virtually eradicated in dairy cattle, its prevalence having fallen from 12 per cent at the commencement of the program to 0.025 per cent". All States except South Australia and Queensland and the Northern Territory had attempted, in varying degrees, to control tuberculosis in the beef industry. Greatest success was achieved in Tasmania where tuberculosis had been of only minor importance for the past 20 years. Substantial progress was also made in Victoria, New South Wales and in Western Australia (apart from the Kimberley region). Efforts to control tuberculosis were concentrated in dairy areas and little attention was given to the northern and pastoral beef grazing regions where prevalence remained relatively high.

The slaughter of reactors was compulsory in all States, but in the Northern Territory only dairy reactors were compulsorily slaughtered. Compensation was paid for animals slaughtered except for voluntarily slaughtered beef cattle in the Northern Territory. Finance for compensation was shared by producers and State Governments, except in the Northern Territory and Tasmania where compensation was provided wholly from state revenue. In other States, financial contributions made to cattle disease compensation funds by producers and Governments differed considerably. In South Australia and New South Wales, producers provided all finance for compensation and in the former State the fund was government guaranteed. In Queensland and Western Australia financial contributions were shared equally by producers and State Governments, while in Victoria the Government provided 60 per cent of compensation finance.

BRUCELLOSIS AND TUBERCULOSIS

Towards the end of the 1960s it became apparent that the existing measures would only hold the prevalence at relatively low levels and would not achieve eradication. A range of new measures would need to be introduced and separate State programs would have to be co-ordinated if re-infection were to be avoided. In 1967 the national Brucellosis and Tuberculosis Committee was established to co-ordinate the eradication of these two diseases and through this co-ordinating body, measures for further advancement towards eradication were determined and all States formulated a plan of action.

Progress since 1970

An important measure which had been considered in the late 1960s was the tail or back tagging system of tracing carcasses, found to be diseased on inspection, back to their property of origin. This system is operating in all States (except Queensland) and in the Northern Territory. Although there has been a trace back system in Queensland for some ten years, it is based on cattle brands and not on tail or back tags. As well as identifying infected properties, the trace back scheme provides a continuous assessment of changes in prevalence on a regional basis and is also a valuable device for monitoring outbreaks of disease when eradication has been virtually achieved. Infected commercial pigs can also be traced to the property of origin in Western Australia and New South Wales.

Following detection of infected herds through trace-back, all animals on the property are tuberculin tested. All herds with active cases of tuberculosis are re-tested at 60 day intervals and no herd is regarded as completely free of tuberculosis until it has passed two consecutive tuberculin tests at intervals of 60 days. In conjunction with this testing, tuberculosis-free herd accreditation is encouraged.

Another measure necessary for successful eradication of tuberculosis is the control of cattle movements both within and between States. All States and the Northern Territory have legislated to control cattle

BRUCELLOSIS AND TUBERCULOSIS

movements and have updated these restrictions in recent years in accordance with the uniform nation-wide approach suggested by the Animal Health Committee. Regulations relating to incoming cattle are similar to those already mentioned in the section on brucellosis in that a health certificate is generally required providing evidence of negative reaction to a tuberculin test.

As a result of anti-tuberculosis measures taken especially since 1970, some mainland States are currently approaching eradication (Tasmania was free prior to 1970). Victoria had a very low prevalence of the disease in 1972-73, and is regarded as complying with the requirements for declaration as 'provisionally-free' of tuberculosis. New South Wales also has a very low prevalence and the State Department of Agriculture indicated in evidence that the State will be declared 'provisionally-free' in 1975.

In all other States and the Northern Territory an active eradication program is continuing and large sectors of these States, mainly the dairy and agricultural areas, have a very low prevalence of tuberculosis. However, there is a relatively high prevalence in the extensive beef areas. The Australian National Cattlemen's Council submitted in evidence that in the far west of Queensland, prevalence is around 3 to 4 per cent and 100 per cent of herds are infected. In the northern pastoral areas of South Australia the prevalence in some herds is as high as 8 per cent.

The Commonwealth Scientific and Industrial Research Organisation submitted in evidence that eradication in the extensive beef grazing areas could possibly be aided by the use of a short-duration tubercular test. The present testing procedure takes 72 to 96 hours to complete. This would be reduced to 6 to 24 hours using the new technique, but this procedure has not yet been developed for commercial use.

The Animal Health Committee has estimated that despite the relatively high prevalence of tuberculosis in the extensive beef grazing areas, bovine tuberculosis will have been largely eradicated within ten years.

BRUCELLOSIS AND TUBERCULOSIS

However, isolated pockets of infection may remain. These are likely to exist in western Queensland and the far northern areas of Western Australia and the Northern Territory. In these areas the Animal Health Committee was not able to estimate a date when eradication may be achieved.

Compensation funding

Tuberculosis eradication is funded by returns from the export tax on beef and veal raised from producers, by the Australian Government, and by State Government contributions. The Australian Government contributes \$50 per slaughtered reactor as part compensation. This amount has been paid since July 1973 and is not recovered by way of the export tax. The Australian Government's contribution for compensation was provided on condition that the State Governments also contribute \$25 per reactor and was decided on the basis that the Australian Government would pay 50 per cent of compensation with State Governments and the producers each meeting 25 per cent.

Although the current arrangements for slaughter compensation for tuberculosis reactors were generally supported by most witnesses there were some suggestions for the Australian Government's contribution to be changed from a flat rate of \$50 per slaughtered reactor to 50 per cent of full market value.

BRUCELLOSIS AND TUBERCULOSIS

SECTION 10 CONCLUSIONS (TUBERCULOSIS)

Bovine tuberculosis is a contagious disease of cattle which causes loss of productivity in the beef and dairy industries. Animals die or fail to thrive and meat and milk production are lost. In the past, bovine tuberculosis has been a hazard to human health but with the almost universal pasteurisation of milk the danger has been largely overcome. Because of restrictions imposed by the United States of America, export of meat from tuberculosis infected animals and from tuberculosis reactors has been banned by the Australian Department of Agriculture. Evidence was presented that complete eradication of tuberculosis from Australia's cattle population is necessary to avoid possible further restraints on exports of beef and dairy products.

Complete eradication of tuberculosis requires a test and slaughter campaign - there is no vaccine. Veterinary evidence indicated that tuberculosis eradication was technically possible and eradication campaigns have already reduced the prevalence of tuberculosis to very low levels. Greatest progress has been achieved in Tasmania, New South Wales and Victoria. In the remaining States, prevalence is still relatively high in the remote areas where there is extensive grazing of beef cattle. Witnesses indicated that it was likely that buffaloes in the Northern Territory would have to be eliminated or controlled before tuberculosis eradication could succeed there. The Commission considers that it is necessary to achieve Australia-wide tuberculosis eradication as quickly as possible. For this reason, the Commission considers that further attention should be given to the buffalo problem by the relevant authorities.

The case for Australian Government assistance for the eradication of bovine tuberculosis rests on the same grounds as the case for assistance for eradication of brucellosis. The arguments for assistance are as follows: the threat to human health; the potential community liability for reconstruction of the beef and dairy industries if substantial export markets are lost; and, the encouragement of producers and States in working towards the eradication of the disease at an early date. Because the tuberculosis eradication scheme is so well advanced, with apparently good participation of producers and States, the force of the above arguments is less than in the case of brucellosis.

BRUCELLOSIS AND TUBERCULOSIS

Also, because tuberculosis eradication is well advanced there is now not the same need to undertake a massive program to accelerate progress towards eradication as in the case of brucellosis. Hence, the Commission does not recommend the same level of assistance for tuberculosis.

The Commission will recommend that the Australian Government provide from consolidated revenue 50 per cent of the net compensation cost of tuberculosis reactors which are compulsorily slaughtered with the States and producers sharing the remainder as at present. The Australian Government contribution should continue until the end of 1983. The tuberculosis and brucellosis eradication programs are being managed jointly and this date would allow review of these programs at the same time. Compensation should be based on full market value (defined in section 6).

Assuming that the Australian Government's contribution of 50 per cent of net compensation averages \$50 per reactor, the Australian Government contribution is estimated at \$360,000 for the States and \$930,000 for the Northern Territory for the three years to 1977-78. In later years the cost is likely to be lower.

A 50 per cent contribution towards compensation is considered by the Commission to be more appropriate than the existing flat \$50 per reactor. The amount of the net compensation cost per animal will vary with changes in livestock prices over time and with the differences between animals in the physical effects of the disease (and hence the extent of discounting for loss of recoverable meat). An Australian Government contribution of 50 per cent would provide, more adequately than the flat cash sum, equity between producers at a specific time, that is between producers whose tuberculosis reactors are heavily discounted because of infection and those whose reactors are not; and between producers over time, that is, between periods of high prices and periods of low prices, when the share of producer contributions to compensation would be expected to vary with livestock price change.

BRUCELLOSIS AND TUBERCULOSIS

In the view of the Commission, stud cattle should be excluded from the tuberculosis compensation scheme. The reason for their exclusion is the same as that given earlier in Part 1 on brucellosis, that is that stud cattle are difficult to value.

BRUCELLOSIS AND TUBERCULOSIS

SECTION 11 RECOMMENDATIONS

The Commission makes the following recommendations:

Tuberculosis

- . Australian Government financial assistance from consolidated revenue continue to be given after 31 December 1975 to compensate producers for cattle found to be bovine tuberculosis reactors and slaughtered on a compulsory basis. Such assistance should be 50 per cent of net compensation cost; and
- . such assistance continue until 31 December 1983;

Brucellosis

- . Australian Government financial assistance from consolidated revenue be given to compensate producers for cattle found to be bovine brucellosis reactors and slaughtered on a compulsory basis. Such assistance should be 75 per cent of net compensation cost and should only be given if a program is adopted to achieve "provisionally-free" brucellosis status throughout Australia by the end of 1983; and
- . such assistance continue until 31 December 1983.

General

Attention is drawn to the Commission's suggestions that:

- . the Australian Government should secure the agreement of State Governments that compensation for tuberculosis and brucellosis reactors should be based on "full market value";
- . State Governments should contribute a proportion of net compensation cost for tuberculosis and brucellosis reactors;

BRUCELLOSIS AND TUBERCULOSIS

- all possible steps should be taken to overcome unfair discounting of tuberculosis and brucellosis reactors;
- Australian Government loan finance should be made available for the brucellosis eradication program; and
- registered stud cattle should be excluded from the compensation schemes.

Attention is also drawn to other suggestions made in the conclusions sections of this report.

...C.W...CONRON..... Commissioner

HYLDA A. ROLFE
..... Commissioner

CANBERRA, AUSTRALIAN CAPITAL TERRITORY

10 April..... 1975

BRUCELLOSIS AND TUBERCULOSIS

APPENDIX 1

TERMS OF REFERENCE

I, EDWARD GOUGH WHITLAM, the Prime Minister

1. Refer the following matters to the Industries Assistance Commission for enquiry and report in accordance with Section 23 of the Industries Assistance Commission Act 1973 -
 - (a) whether Australian Government financial assistance should continue to be given after 31 December 1975, to compensate producers for cattle found to be bovine tuberculosis reactors and slaughtered and, if so, the nature and extent of such assistance.
 - (b) whether Australian Government financial assistance should be given to compensate producers for cattle found to be bovine brucellosis reactors and slaughtered and, if so, the nature and extent of such assistance.
 - (c) for what period of time should any recommended assistance be provided.
2. Specify the period of thirteen (13) months commencing on the date of this reference as the period within which the Commission is to report on the matter described in paragraph 1, of this reference.

E.G. WHITLAM

Prime Minister

11 March 1974

LIST OF WITNESSESAPPENDIX 2

Name of witness and capacity in which appearing	Organisation or company represented	Address
Reginald John Green, chairman) Patrick Robert Harvey,) member (also chairman of the) Brucellosis and Tuberculosis Sub-) committee of the Committee))	Standing Committee on Agriculture Animal Health Committee	C/- Australian Department of Agriculture, Barton, Australian Capital Territory
Alexander Kirk Lascelles, chief, division of animal health	Commonwealth Scientific and Industrial Research Organisation	Park Drive, Parkville, Victoria
Donald Mannix Flynn, chief, division of animal health	Department of Agriculture, Victoria	3 Treasury Place, Melbourne, Victoria
Arthur Linehan Clay, director, division of animal industry	Department of Primary Industries, Queensland	William Street, Brisbane, Queensland
William Pyle, senior vice- chairman (manufacturing section)) Herbert John Roberts, deputy) president)	Victorian Farmers' Union - Dairy Division Victorian Dairymen's Association	24 Collins Street, Melbourne, Victoria 576 St. Kilda Road, Melbourne, Victoria
Patrick Robert Harvey, chief veterinary officer	Department of Agriculture, South Australia	Agriculture Building, 133-137 Gawler Place, Adelaide, South Australia

BRUCELLOSIS AND TUBERCULOSIS

Page 2 of APPENDIX 2

Name of witness and capacity in which appearing	Organisation or company represented	Address
Peter Bruce Lewis, senior veterinary surgeon	Department of Agriculture, Western Australia	Jarrah Road, South Perth, Western Australia
Reginald John Green, chief veterinary officer	Department of Agriculture, Tasmania	Marine Board Building, 1 Franklin Wharf, Hobart, Tasmania
Barry Hart,) director, animal industry and) agriculture branch) David Alan Newton-Tabrett,) senior veterinary officer)	Department of the Northern Territory	Mitchell Street, Darwin, Northern Territory
Darwin Rennell, veterinary officer	A.C.T. Health Services, Department of Health	C.M.L. Building, Darwin Place, Canberra City, Australian Capital Territory
Audrey Beatrice Peters	Canberra Consumers Incorporated	Canberra City, Australian Capital Territory
Joseph Mailath, assistant secretary, beef and general commodities branch, commodities division	Department of Northern Development	Caga Centre, North Tower, Canberra City, Australian Capital Territory
Richard Stewart Morris) Richard Treloar Roe)	Veterinary Preventive Medicine and Epidemiology Unit, University of Melbourne	Princes Highway, Werribee, Victoria

Name of witness and capacity in which appearing	Organisation or company represented	Address
Michael Alexander Sutherland Jones, director of technical services	Australian Meat Board	30 Grosvenor Street, Sydney, New South Wales
James Richard Smith, assistant secretary	Australian Department of Agriculture	Barton, Australian Capital Territory
Thomas Bedwell Bullock, secretary	New South Wales Meat Industry Authority	2 Help Street, Chatswood, New South Wales
Richard Struth Wilson, chairman) Baden John Cameron,) executive secretary)	Australian National Cattlemen's Council	44 Young Street, Sydney, New South Wales
Glen John Dudley Dalton, economist	The Australian Wool and Meat Producers' Federation	10 Castlereagh Street, Sydney, New South Wales
Achol Ferguson Baird,) secretary) Thomas Livesley Phillips)	Australian Dairy Industry Council	Suite 3A, 15th Floor, 27 Turbot Street, Brisbane, Queensland
Roland Henry Paxton, member (producers' representative)	Dairy Industry Authority of New South Wales	71-75 Regent Street, Sydney, New South Wales
George Arthur Savell, assistant association secretary	The Pastoralists & Graziers Association of Western Australia (Inc.)	Pastoral House, 156 St. George's Terrace, Perth, Western Australia

BRUCELLOSIS AND TUBERCULOSIS

Page 4 of APPENDIX 2

Name of witness and capacity in which appearing	Organisation or company represented	Address
Clayton Robinson Manners, research officer	The Farmers' Union of W.A. (Inc.)	239 Adelaide Terrace, Perth, Western Australia
John Allan Dumaresq	The Tasmanian Farmers Federation	16 Cameron Street, Launceston, Tasmania
Ian Donald Cameron-Stephen, assistant director-general, animal quarantine branch	Australian Department of Health	Melrose Drive, Mawson, Australian Capital Territory
Frederick Walther Evans, veterinary officer James Howard Johnston, economist	Department of Agriculture, New South Wales Australian Meatworks' Federal Council (representing a number of abattoirs in New South Wales)	State Office Block, Phillip Street, Sydney New South Wales 109 Paul Buildings, 35 Pitt Street, Sydney, New South Wales
Keith Francis Gooley	Australian Meat Exporters' Federal Council	4th Floor, 30 Grosvenor Street, Sydney, New South Wales
Peter Harold Johnston councillor	The Council of Australian Public Abattoir Authorities	C/- Metropolitan Meat Industry Board, Homebush Bay, New South Wales
Eric Alfred Stubbs, secretary		

Name of witness and capacity in which appearing	Organisation or company represented	Address
Ronald Henry John Hyne, federal president	) The Australian Veterinary Association	72 Parramatta Road, Camperdown, New South Wales
Glen Robert Reginald Murray, secretary	) Australian Association of Cattle Veterinarians	
Douglas Charles Blood, councillor	) Australian College of Veterinary Scientists	A.V.A. House, 272 Brunswick Road, Brunswick, Victoria
Klaus van der Kooi, general manager	) Philips-Duphar Pty. Limited	4 Sirius Road, Lane Cove, New South Wales
Arthur Farquhar Webster, managing director	) Arthur Webster Pty. Ltd.	226 Windsor Road, Northmead, New South Wales
Arthur Charles Webster, general manager)	
William Edward Leembruggen de Vos, secretary, Cattle Producers Council, executive secretary, Northern Territory Pastoral Lessees Association	) Cattle Producers Council Northern Territory Pastoral Lessees Association	2 Carrington Street, Sydney, New South Wales

BRUCELLOSIS AND TUBERCULOSIS

APPENDIX 3

SUGGESTIONS

This appendix summarises witnesses suggestions relating to the provision of finance for slaughter compensation or relating to general financial aspects of the eradication programs.

Standing Committee on Agriculture, Animal Health Committee suggested that:

- compensation should be paid for all cattle ordered for slaughter as a result of the tuberculosis and brucellosis eradication schemes;
- compensation should be based on the market value of the animal;
- for tuberculosis the Australian Government should contribute half the compensation; and
- for brucellosis the Australian Government should meet the entire compensation cost.

Department of Agriculture, Victoria suggested that:

- the allocation of funds to States for each financial year should continue to be based on the established principles and that the present system of a National Committee is a proven satisfactory method of operation; and
- funds available for compensation should be distributed between States in proportion to the number of cattle for which compensation is paid.

Department of Primary Industries, Queensland suggested that:

- compensation should only be paid in an eradication situation;
- compensation should be set at the value of an equivalent healthy animal, less an acceptable contribution by the owner.

Arthur L. Clay of the Queensland Department of Primary Industries suggested that:

- the present arrangement whereby the Australian Government contributes 50 per cent of the cost of compensation is fair and reasonable and should apply to both tuberculosis and brucellosis.

Victorian Dairyfarmers' Association suggested that:

- compensation should be paid to owners of cattle that are compulsorily slaughtered;
- compensation should be based on market value as this would take into account fluctuations in value;

BRUCELLOSIS AND TUBERCULOSIS

Page 2 of APPENDIX 3

- all sections of government and industry should contribute to the compensation, with no differentiation with regard to tuberculosis or brucellosis; and
- finance could be raised through a levy on sales, exports or imports of meat or on the throughput of abattoirs.

Department of Agriculture, South Australia suggested that:

- in both tuberculosis and brucellosis compensation should be paid on all cattle ordered for slaughter;
- compensation should be allocated on the basis of the number of reactors slaughtered, which will need a flexible approach to funding;
- for tuberculosis, the current arrangement by which the Australian Government pays a flat \$50 per reactor should continue; and
- for brucellosis, the Australian Government should assume the full costs of compensation.

Department of Agriculture, Western Australia suggested that:

- compensation should be based on an agreed market value, that is the clearing sale value of the animal; and
- for tuberculosis and brucellosis the Australian Government should contribute 50 per cent of the cost of compensation.

Department of Agriculture, Tasmania suggested that:

- it is essential to fully recompense owners of cattle slaughtered in an eradication campaign;
- maximum compensation figures for various classes of cattle in various areas should be set (to minimise problems caused by 'market value' estimates); and
- the Australian Government should make an immediate decision to underwrite compensation to an agreed maximum, to be adjusted periodically in relation to cattle numbers.

Department of the Northern Territory suggested that:

- eradication of brucellosis, except on the best managed and motivated stations would not be possible without compensation;
- the most satisfactory method of determining compensation levels for the Northern Territory is that presently used for tuberculosis compensation whereby fair values are established annually for all categories of cattle based on the previous seasons prices.

BRUCELLOSIS AND TUBERCULOSIS

Page 3 of APPENDIX 3

A.C.T. Health Services, Department of Health suggested that:

- . in low prevalence circumstances compulsory slaughter is essential, and its implementation is encouraged by appropriate compensation; and
- . compensation of half market value, with no maximum limit is favoured.

Canberra Consumers Incorporated, submitted that:

- . assistance should not continue to be given to owners of slaughtered brucellosis reactors until the various Australian Governments make a full-scale effort to stop the spread of brucellosis or to prevent its introduction into Australia, and to protect the well-being of the Australian consumer.

R.S. Morris and R.T. Roe of the Veterinary Preventive Medicine and Epidemiology Unit, University of Melbourne suggested that:

- . consideration should be given to the adoption of different approaches to brucellosis eradication in the beef and dairy industries;
- . there is adequate economic and social justification for substantial contributions to be made from general revenue.

Australian Meat Board submitted that:

- . reactors should be compulsorily slaughtered and compensation paid to owners;
- . costs of eradication and compensation should be shared by the Australian Government, the State Governments and the cattle producers;
- . the Australian Government should continue its contribution to compensation for tuberculosis reactors until eradication is complete; and
- . the eradication programs of both brucellosis and tuberculosis should be speeded up with a national compensation scheme.

New South Wales Meat Industry Authority suggested that:

- . slaughter must be compulsory and compensation paid;
- . compensation for tuberculosis and brucellosis should be financed by the Australian Government from consolidated revenue; and
- . compensation should be the assessed market value of animals up to a maximum of \$150 less the net value of the recoverable portion of the carcass.

BRUCELLOSIS AND TUBERCULOSIS

Page 4 of APPENDIX 3

Australian National Cattlemen's Council, suggested that:

- the Australian Government continue to pay the first \$50 of the compensatable value of tuberculosis reactors;
- a compensation scheme for brucellosis reactors is required before compulsory slaughter can be introduced; and
- a flat rate of compensation, reviewed annually and covering all classes of stock should be used.

The Australian Wool and Meat Producers' Federation suggested that:

- compensation should be paid for cattle slaughtered compulsorily and voluntarily;
- compensation is justified from community funds because of the benefits of eradication to the community; and
- market value should be the basis of compensation.

Australian Dairy Industry Council suggested that:

- compensation should be based on the value of lost production plus the replacement value of stock slaughtered less the carcass recovery value.

The New South Wales Dairy Industry Authority suggested that:

- reactors should be slaughtered and compensation paid;
- as benefits are shared by all sections of the community the costs should also be equated on that basis; and
- compensation should be 9/10 of the slaughter value of the animal based on the current saleyard price.

The Pastoralists & Graziers Association of Western Australia (Inc.) suggested that:

- compensation should be paid for voluntarily and compulsorily slaughtered cattle;
- the Australian Government, State Governments and producers should contribute one-third each of the total cost of eradication; and
- compensation should be assessed as the value of an equivalent non-diseased beast.

BRUCELLOSIS AND TUBERCULOSIS

Page 5 of APPENDIX 3

The Farmers' Union of W.A. (Inc.) suggested that:

- . slaughter compensation should be the joint responsibility of producers and the State Governments and the Australian Government; and
- . compensation should be paid on the market value.

The Tasmanian Farmers Federation suggested that:

- . compensation for animals compulsorily destroyed is essential; no compensation for voluntarily destroyed animals should be paid;
- . the Australian Government should be responsible for providing the major portion of the finance required; and
- . market value is the most equitable method of compensation.

Department of Agriculture New South Wales suggested that:

- . cattle owners should be paid the cost of replacing reactors with non-diseased equivalent animals;
- . total costs (including compensation) should be paid by the various beneficiaries of eradication in proportion to the extent that they benefit in present value terms; and
- . the Australian Government should pay for compensation of brucella reactors.

Australian Meatworks Federal Council suggested that:

- . compensation arrangements should provide sufficient inducement for livestock owners to willingly participate in the campaign, and should continue until full eradication is achieved.

The Council of Australian Public Abattoir Authorities suggested that :

- . compulsory payment of compensation to owners should be made; and
- . compensation should be assessed on market value less the net recoverable portion of the carcass.

The Australian Veterinary Association suggested that:

- . compensation of the order of prevailing market prices should be paid, until diseases are eradicated.

BRUCELLOSIS AND TUBERCULOSIS

Page 6 of APPENDIX 3

Australian College of Veterinary Scientists suggested that:

- eradication will not succeed without fair and just compensation; and
- compensation should be based on market value.

SUGGESTIONS ON WHICH THE COMMISSION
HAS NOT DIRECTLY COMMENTED

- Compensation should be paid for voluntarily slaughtered brucellosis or tuberculosis reactors.
Suggested by the Animal Health Committee of the Standing Committee on Agriculture and The Australian Wool and Meat Producers' Federation.
Opposed by the Queensland Department of Primary Industries, the New South Wales Meat Industry Authority and The Tasmanian Farmers Federation.
- Brucellosis vaccination should be compulsory.
Suggested by Mr. A.L. Clay.
- Compensation should be paid for loss of farm production resulting from brucellosis or tuberculosis.
Suggested by the Australian Dairy Industry Council.
Opposed by the Animal Health Committee and the South Australian Department of Agriculture.
- An Australian-wide uniform system of identification of reactors should be implemented.
Suggested by the Victorian Department of Agriculture.
- Importation of unpasteurised dairy products should be prohibited. Strict microbiological standards should be drawn up for dairy products and uniformly implemented.
Suggested by Canberra Consumers Incorporated.
- Imports of dairy products should be restricted to products from countries free of bovine brucellosis and tuberculosis.
Suggested by the Australian Dairy Industry Council.
- Funds should be made available on a more adequate scale for continuing epidemiological analysis of national disease control activities.
Suggested by Morris and Roe.

- . The Australian and State Governments should agree to provide adequate compensation for workers who may contract brucellosis from handling reactors.

Suggested by the Australian Meat Board.

- . Producer compensation funds should be established in Queensland and the Northern Territory.

Where a two herd scheme has commenced, producers should receive compensation for all breeders that have not been tuberculin tested, but are positive at meatworks.

Suggested by the Australian National Cattlemen's Council.

- . There should be compensation for extra costs incurred by meat processors as a result of the eradication campaigns.

Suggested by the Australian Meatworks Federal Council.

- . Compensation should be paid for all cattle ordered for slaughter as a result of brucellosis or tuberculosis, not just for reactors.

Suggested by the South Australian Department of Agriculture.

BRUCELLOSIS AND TUBERCULOSIS

APPENDIX 5

COMPENSATION FUNDS

This appendix lists details of compensation payments in the States at the time of the Commission's public inquiry.

Queensland

Compensation for tuberculosis reactors is paid per head at the following differential rates:

Heifers	\$67.50
Cows 7 years old and under	\$90
Cows over 7 years old	\$75
Bulls	\$112.50

In addition, cattle owners are reimbursed for transport and killing fees for cattle ordered for slaughter. However, the salvage value of the carcass is offset against the above payments. If the carcass value exceeds the aggregate value of compensation, freight and killing fee, no payments are made from the compensation fund.

New South Wales

Compensation is payable in the case of tuberculosis under the N.S.W. Cattle Compensation Act which came into force in 1952. A market valuation is agreed upon by the owner and an inspector. The owner pays the freight charge and receives the carcass value less killing charges. If lesions are detected at slaughter the owner is only entitled to 90 per cent of the market value. The maximum value allowable is now \$150 (\$100 prior to 31 January 1971). Payments to the owner consist of the gross compensation payable less residual carcass value and freight.

Funds are derived from:

- 5c per head Pastures Protection Board levy on ratepayers' annual cattle returns;
- 10c per head slaughter levy (stamp duty tax) on cattle slaughtered; and
- interest from the investment of accumulated funds.

Victoria

Tuberculosis is listed as a compensatable disease under the Cattle Compensation Act of 1967. This provides for payment of compensation for cattle destroyed by, or by order of, an inspector of stock because the cattle are suffering from, or suspected of suffering from, tuberculosis. Compensation

BRUCELLOSIS AND TUBERCULOSIS

Page 2 of APPENDIX 5

also is payable for any carcass or portion of a carcass condemned at an abattoir as unfit for human consumption.

The Act provides for the payment to the fund of all money received by or for the Comptroller of Stamps in respect of stamp duty payable on the sale of cattle and any residual value obtained from carcasses. The Act also provides that an amount equal to the residual value will be paid out of the fund and that the State Treasury will pay 40 per cent of the balance of money owing for compensation and the remainder to be paid out of the fund.

South Australia

The Cattle Compensation Act of 1939 instituted compensation for cattle with tuberculosis. The basis of payment of compensation is related to the market value of the animal or carcass at the time of testing or condemnation respectively. The owner is virtually guaranteed a value agreed between him and the inspector and the amount of compensation paid is the agreed value less any residual monies received for the carcass, offals and hide. The fund is an industry fund established by a levy on all cattle or carcasses sold. The current levy is \$0.05 per \$20 of value with a maximum levy payable of \$0.50. Maximum compensation payable is \$200. The fund is guaranteed by the South Australian Government.

Western Australia

The Cattle Industry Compensation Act (No. 41 of 1965), as amended, provides for compensation for tuberculosis and brucellosis reactors. Compensation is currently financed by a levy of \$0.003 for each \$1.00 or fractional part in respect to sale of any one animal or carcass, not exceeding \$0.25. The State Treasury matches the amount raised from the levy.

BRUCELLOSIS AND TUBERCULOSIS

Page 3 of APPENDIX 5

Current maximum rates of compensation are :

- . Commercial
 - . bulls - \$500
 - . other - \$200
- . Stud
 - . bulls - \$1000
 - . other - \$600
- . Carcasses
 - . bulls - \$250
 - . other - \$200

Tasmania

Compensation for brucellosis and tuberculosis reactors is financed solely from State revenue. Section 13 of the Stock Act 1932 as amended in 1971 provides for compensation to be paid at the rate of full market value, with no limit on the amount payable.

Northern Territory

Payments of compensation for tuberculosis control are made under the Dairies Supervision Ordinance 1939-1957. Compensation payment is based on agreement between the cattle owner and the Chief Medical Officer on the current market value of the animal to be slaughtered. The owner receives 50 per cent of the agreed value less the amount received for the carcass. If the Chief Medical Officer is satisfied that post mortem examination of the reactor shows that it is not affected with tuberculosis then the owner receives the full assessed value of the animal. Payments for compensation are made from consolidated revenue.

BRUCELLOSIS ERADICATION SCHEMES OVERSEAS

The progress made towards eradication of brucellosis in countries overseas (particularly in Australia's beef trading partners) will influence whether Australian beef and dairy products will be excluded from foreign markets. The following information on progress achieved abroad is based on evidence given by Dr P.R. Harvey representing the Standing Committee on Agriculture, Animal Health Committee.

New Zealand

A brucellosis eradication program commenced in September 1971. At that time the prevalence of the disease was 4.3 per cent in dairy herds and 1.1 per cent in beef herds. Initial vaccination with Strain 19 is compulsory, except in areas where the prevalence is low enough to begin the test and slaughter phase. Tests are conducted on an area basis and reactors are compulsorily slaughtered. Retesting is carried out until a herd is accredited as brucellosis free. This status is achieved when a herd has two consecutive clean tests, with an interval between tests of at least six months. An area is accredited as brucellosis-free when the prevalence of the disease in the area is reduced to 0.2 per cent. By mid-1974, approximately half the cattle population was subject to test. It is anticipated that the test and slaughter campaign will be extended to all cattle by 1977.

Owners of cattle compulsorily slaughtered under the brucellosis eradication program receive Government compensation of \$NZ8 for cattle aged six months and under 12 months and \$NZ16 for cattle 12 months and over. In addition, dairy cattle supplying town milk attract a bonus of \$NZ30. Owners of dairy cattle supplying milk to factories receive a seasonal bonus ranging from \$NZ10 to \$NZ50 according to the time of slaughter. Cattle owners also receive the value of the carcass. Compensation costs and all administrative expenses associated with eradication are paid by the government.

United States of America

A campaign to eradicate brucellosis commenced in the United States of America in 1934 and was accelerated in 1954 when increased funds were made available by Congress.

Initial vaccination is carried out with Strain 19 and followed by a test and slaughter phase. When the prevalence of brucellosis in a particular area is reduced to 0.2 per cent and no more than 1 per cent of herds remain infected, the area is proclaimed certified brucellosis free.

The eradication campaign in the United States of America is nearing completion. Little vaccination is carried out - about 3 million calves being vaccinated annually from a total calf-drop of 30 million. Over 99 per cent of the cattle population is free of brucellosis and complete freedom is expected in 1983.

More than US\$750 million of public money has been spent on the scheme since 1954. Total annual expenditure is presently US\$40-45 million - approximately half of which is contributed by the Federal Government. Federal Government funds can be used for all eradication expenditure, including compensation, but not for vaccination. The basis of compensation is determined by each State and may differ among States. The Federal Government makes available a maximum amount for compensation of US\$50 per head for grade cows and US\$100 per head for pure bred cows. These figures were originally determined on the basis of one third contribution each by Federal and State Governments with the third share borne by the owner of the slaughtered reactor. The State Governments are not obliged to use Federal funds for compensation and in Texas no compensation is paid. In Oregon, authorities pay up to 80 per cent of the value of reactor cattle including stud animals. Other States may match the Federal contribution and others may make up compensation to full market value. In calculating the amount of compensation

BRUCELLOSIS AND TUBERCULOSIS

Page 3 of APPENDIX 6

paid in all States, the salvage value of the carcass is considered, so that the owner of reactors cannot receive more than the market value of the animal. There is no industry levy raised to pay for compensation of the cost of the campaign.

Canada

The test and slaughter campaign for brucellosis in Canada began in 1956 following a period of Strain 19 vaccination. By 1966, all cattle had been tested at least once. At that time, 80 per cent of cattle were in areas where the prevalence of brucellosis was less than 0.1 per cent and the number of infected herds was below 1 per cent. The remaining 20 per cent of cattle were in areas where the individual cattle prevalence and the herd prevalence were less than 1 per cent and 5 per cent respectively. Despite generally good progress there are currently some 300-400 infected herds being located per year, most of these in the Province of Ontario.

Compensation is paid to owners of cattle slaughtered on account of brucellosis. The maximum compensation is CAN\$450 for pure bred registered cattle and CAN\$200 for grade cattle. The animals are valued by Departmental officers on a points system which considers the pedigree of the animal, its conformation, age and immediate or prospective usefulness. Compensation is paid in addition to the salvage value of the carcass and is designed to enable the livestock owner to replace condemned stock with a minimum of financial loss.

Responsibility for brucellosis eradication is accepted by the central government which provides all finance, facilities and staff.

Eire

A test and slaughter scheme began in Eire in 1966. At that time, the herd prevalence was 12 per cent, although there was considerable variation between counties, especially between northern and southern areas.

BRUCELLOSIS AND TUBERCULOSIS

Page 4 of APPENDIX 6

Following a test and slaughter campaign in the north, six counties have been declared free. Compulsory test and slaughter is continuing in a further seven counties in the centre of the Republic. The remainder of the country is classified as a control area in which free vaccination is provided in order to reduce the prevalence of the disease. In these areas, voluntary eradication is encouraged. The owner retains the salvage value of the carcass and compensation of 30 per head is paid plus a further sum dependent upon a herd having two consecutive clear tests over a period of up to 4 years following initial identification of a reactor herd. For herds having two consecutive clear tests in 2, 3 or 4 years after identification of brucellosis, the extra sum paid for reactors is £Ir20, £Ir 15 and £Ir 5 respectively. No extra payment is made for reactors detected more than 4 years after a reactor herd is first identified. The purpose of this reducing compensation for voluntarily slaughtered reactors is to encourage slaughter and the achievement of eradication as soon as possible after the infection is discovered.

Compensation is paid, also, for all cattle slaughtered in either the 'free' or compulsory eradication areas. Compensation in these areas is based on full market value as agreed between the owner and the Ministry. The market value is defined as the price which would have been paid for the animal at the time of possession had the animal been healthy. In disputed cases there is an independent valuation. All brucellosis eradication expenditure, including compensation costs, are fully financed by the central government.

United Kingdom

Vaccination with Strain 19 has been undertaken in the United Kingdom since 1942. In 1960-61 the prevalence of brucellosis in dairy cattle was 2 per cent, although a test and slaughter campaign was not commenced until 1967 in conjunction with a brucellosis accredited herd scheme. The purpose of this scheme was to develop a stock of brucellosis free cattle from which replacement cattle could be drawn when a compulsory test and slaughter campaign

began. Participation in the accredited herd scheme was voluntary and compensation was not paid for slaughtered reactors in all cases. In 1970, compensation was discontinued and replaced with incentive payments, payable for a period of five years after a herd achieves brucellosis free status.

Compulsory eradication has since been introduced on an area basis. Within an area under compulsory eradication all herds not participating in the accredited herd scheme are compulsorily tested. Compensation for reactors is at market value, to a maximum of £stg240 per animal. Herds that are freed of brucellosis as a result of compulsory test and slaughter do not receive incentive payments. If an accredited herd within a compulsory test and slaughter area becomes infected, compensation is paid at the rate of 75 per cent of market value and the maximum compensation is £stg180.

The costs of eradication are borne solely by the central government. It is estimated that the scheme has so far cost 150 m. and at least as much again will be required before complete eradication is achieved, possibly within the next 10 to 15 years.

Netherlands

In the Netherlands, a compulsory test and slaughter program commenced in 1958 following intensive Strain 19 vaccination in the early 1950s. In 1957, 30 per cent of herds were found to be infected with brucellosis, although rapid progress towards eradication was made in the late 1950s and 1960s. By 1967 there was one infected farm per 1,000 and this was further reduced to less than one per 10,000 by 1970. The remaining elements of brucellosis are controlled by test and slaughter; vaccination has been prohibited since 1965.

Slaughtered reactors are compensated at the rate of 90 per cent of market value but when an entire herd is slaughtered as a result of contact with an infected animal full market value is paid. Half the costs of eradication are provided by the central government and half from a levy imposed on farmers.

CATTLE MOVEMENT REGULATIONS

This appendix gives details of cattle movement regulations at the time of the Commission's public hearing.

Queensland

Conditions relating to introduction of animals into Queensland are set out in the Stock Act 1915-1973. A certificate of health is required from the owner, certified to by an inspector in the State of origin who should examine the stock, and an endorsement that the animals have been submitted to a test for

- tuberculosis within the twelve months next preceding the date of introduction; and
- brucellosis within the 28 days next preceding the date of introduction with negative results, or being female cattle, have been vaccinated against brucellosis, if required by the Chief Inspector of Stock.

All travelling cattle must be accompanied by a permit and waybill. Stock may move from properties known to be infected with tuberculosis for immediate slaughter without prior testing. If moving to another property they must pass two negative tests prior to movement.

Regulations prescribed for brucellosis will come into operation when eradication begins. Presently the only restriction applying is in relation to reactor animals. These cannot be moved from the property because of their non-acceptability for slaughter.

New South Wales

No health requirements regarding tuberculosis and brucellosis apply to the introduction of cattle from Victoria and Tasmania.

(i) Inter-state introductions of cattle from Queensland, South Australia, Western Australia and Northern Territory

To be eligible for introduction into New South Wales cattle must be accompanied by the appropriate certificates as follows:

BRUCELLOSIS AND TUBERCULOSIS

Page 2 of APPENDIX 7

(a) Tuberculosis

Cattle must satisfy one or other of the following requirements: -

they must be from a certified tuberculosis free herd,

or

be from a herd in which tuberculosis is not known to exist and have been tested for that disease with negative results within 30 days of introduction

or

be forwarded for immediate slaughter or for sale for immediate slaughter.

(b) Brucellosis

No interstate requirements currently apply in regard to this disease.

(11) Intra-state movements of cattle

(a) Tuberculosis

There are no requirements with regard to the movement of cattle within the State, except those relating to notified protected areas for tuberculosis. These areas cover the coastal strip of the State, the Western Division and the Berriquin Protected area centred on Finley.

To be eligible for introduction into the notified protected areas for tuberculosis cattle shall: -

have been tested within 14 days of introduction with negative results,

or

have been introduced directly from another protected area of the same status,

or

have been introduced directly from a tuberculosis free herd,

or

have been introduced for sale or for slaughter within 14 days.

Cattle sold other than for slaughter must be tested within 14 days.

In each case a permit must have been secured from an Inspector to cover the movement involved.

(b) Brucellosis

The movement of cattle within the State on account of brucellosis is not restricted at this stage. A regulation exists, however, which could be implemented restricting the introduction of untested or unvaccinated female cattle into a protected area.

(iii) Restriction on movements of cattle affected with brucellosis and/or tuberculosis.

(a) Tuberculosis

Herds in which tuberculosis is known or suspected to be present are placed in quarantine and no cattle may be removed from the holding unless with the written permission of an Inspector. Cattle which have reacted to the tuberculin test are identified by the brand of the letter "R" on the right cheek and ordered for slaughter. The movement from the holding to the abattoir is covered by a special permit.

(b) Brucellosis

Herds known or suspected to be infected with brucellosis are placed in quarantine, except for those herds located within protected areas. Restrictions are imposed on movements from these holdings only in respect of reactors to a diagnostic test. Normally only those cattle which have given a positive reaction to the complement fixation test are regarded as being infected, though in somewhat uncommon cases bacteriological evidence may be available. Cattle which have been shown to be infected are identified with an "R" brand on each shoulder and are further identified in a more temporary form by the insertion of a yellow plastic eartag carrying the letter "R". Owners are not required at this junction to dispose of these reactors forthwith, but when they do so they may dispose of them only for slaughter.

Victoria

Control of livestock movement into Victoria from other States and Territories is effected by means of the provisions of the Stock Diseases Act (1968) and Regulations (1970). Restrictions on the introduction of cattle into Victoria relate to the requirement that such cattle must have been tested with negative results in the previous 12 months for tuberculosis, and within the previous 30 days for brucellosis or, in the case of females, have been vaccinated for brucellosis.

BRUCELLOSIS AND TUBERCULOSIS

Page 4 of APPENDIX 7

Intra-state movement of Brucellosis and/or Tuberculosis affected cattle is controlled under the Stock Diseases Act and Regulations that give power to quarantine infected herds to prevent spread of the disease. Orders made under Section 4 of the Act declaring a control area for brucellosis or an eradication area for tuberculosis are applicable to the State as a whole.

South Australia

Legislation prevents the introduction of cattle into South Australia unless accompanied by health certificates. A statement is required on the tuberculosis status of cattle unless they are consigned for immediate slaughter.

Intra-state movement is controlled to prevent infected cattle entering declared protected areas.

Western Australia

1. Tuberculosis

(a) Inter-state

Animals are required to be from accredited free herds or from herds with no evidence of disease, subject to negative tuberculin test.

(b) Intra-state

Movement from the Kimberleys is subject to similar restrictions as for inter-state cattle. Allowance is made for trucking problems by allowing groups, where reactors have been found, to move to approved areas in the south for re-testing.

Quarantine herds have similar restrictions placed on them for movement other than for slaughter.

Therefore, general movement of affected animals is completely blocked other than for slaughter.

2. Brucellosis

(a) Inter-state

Requirements are based on the premise that:

- (i) the Kimberleys are believed free, the remainder of the State being included in an active eradication program
- (ii) herds of origin are either free or suspect and the complement fixation test is the recognised test for movement
- (iii) that movement should be permitted wherever possible, subject to reasonable precautions being taken to prevent introduction of disease.

The brucellosis requirements vary according to the area into which the cattle are to be imported.

Breeding cattle consigned to the Brucellosis Infected Area

Stock must originate either from an officially brucellosis accredited free herd or from a herd in which brucellosis is not known or suspected to exist. Cattle must pass a negative blood test for brucellosis within 30 days of movement. In the case of pregnant cows, prior approval for introduction must be obtained from the Chief Veterinary Surgeon, the cows isolated on the property of introduction and pass a negative blood test between 15 and 45 days after calving.

Breeding cattle consigned to the Kimberley Brucellosis Protected Area

Apart from cattle from accredited free herds, cattle from Tasmania and brucellosis free herds within the Northern Territory Brucellosis Protected Area are accepted into the Kimberley Brucellosis Protected Area. Female cattle from these categories may enter without prior approval provided they have, in the case of cows, passed a single negative blood test within 14 days of movement. Bulls from such herds do not require a blood test but if they are not from such herds they require a double blood test.

Breeding cattle destined for the North-West and South-West Protected Area

As well as cattle from Tasmania, and brucellosis-free herds in the Northern Territory Brucellosis Protected Area, cattle may be introduced from a herd, in any State, which has undergone a full brucella testing regime with negative results within the last 12 months and has controlled introductions since that date.

(b) Intra-State

Similar requirements have to be met for movement of breeding cattle into the Kimberleys from the remainder of the State.

Tasmania

The Stock Act 1932, provides means whereby movements of cattle within the State can be prohibited or restricted on account of existing disease. Such restrictions apply to movements of cattle from King Island to mainland Tasmania. Cattle imported to Tasmania from other States are held in quarantine for a period of three months, primarily as protection from the introduction of brucellosis.

Northern Territory

Restrictions are imposed on stock movements in the Northern Territory through the operation of the Stock Routes and Travelling Stock Ordinance and specific movement instruction requirements issued from time to time.

1. Tuberculosis

All Northern Territory herds are classified in two ways for tuberculosis regulations:

- (a) Prevalence of tuberculosis
 - (i) Free (Class I)
 - (ii) Low prevalence; less than 3% (Class II)
 - (iii) High prevalence; greater than 3% (Class III)
- (b) Area eradication status
 - (i) Compulsory Eradication Area (regarded as Class I destinations)
 - (ii) Voluntary Eradication Area (stations with approved voluntary eradication programs are to be regarded as Class I destinations)

No movement tests are needed for movements from Class I herds, Class II to Class III herds or cattle for immediate slaughter. In all other cases testing is required on all stock for movement. The mob may move when the last test is less than 3%. Negative animals only may move. Retesting takes place at a destination (except between Class II properties in voluntary eradication area) at 60-90 day intervals until a negative mob test is achieved. If facilities at destination are inadequate a negative mob test must be achieved before movement.

Inter-state importations are as above but all cattle must have a minimum of one test.

2. Brucellosis

Herds are classified as brucellosis free or brucellosis infected and the Northern Territory is divided into two major areas. These are the Northern Brucellosis Protected Area and the Compulsory Control Area.

(a) The Northern Brucellosis Protected Area

Female cattle must originate from free properties within the various declared brucellosis areas and must pass a brucellosis testing before movement. Areas which can export females into the area are: Free properties within

- (i) The Kimberley Brucellosis Protected Area
- (ii) The proposed North Queensland Provisionally Free Area
- (iii) Tasmania
- (iv) The Compulsory Control Area of the Northern Territory
- (v) Any "Brucellosis Accredited Free Property" in Australia.

Bulls can enter the Northern Brucellosis Protected Area from any property provided they pass a free test and clinical examination before movement and retesting and clinical examination within 35 days after movement.

(b) The Compulsory Control Area

- (i) Free property to free property - a single Rose Bengal Test (RBT) and Complement Fixation Test (CFT) within 30 days prior to movement is required. Properties with approved voluntary eradication programs are regarded as free properties for the movement of cattle onto them.
- (ii) Free property to infected property - no tests are required. The animals are isolated at their destination until two weeks after completion of the 45/20 vaccination.
- (iii) Infected property to infected property - Single RBT and CFT. A 45/20 vaccination if necessary.
- (iv) Infected property to free property - two blood tests taken 45 days apart plus a 45/20 vaccination. The cattle are isolated during the test period.
- (v) Northern Territory Shows and Sales - treated as free destinations.

(c) Inter-state Importations

Requirements as above but all animals must be given a minimum of one test.

The regulations do prevent general movement of brucellosis and/or tuberculosis infected cattle. No reactor animal for either disease can be sold except for slaughter. All tuberculosis reactors must be marked with a split ear mark in the left ear and all brucellosis reactors in the right ear.

BENEFIT-COST ANALYSIS FOR BRUCELLOSIS ERADICATIONDESCRIPTION AND TABLES

The epidemiology and effects of brucellosis have not been well documented in the literature. For example, little is known of the effect on prevalence levels of vaccination or of eradication programs. Again, the various effects of the disease at different prevalence levels have not been accurately quantified. Information is incomplete and estimates must be based on subjective assessments in many instances. As a result reliable estimates of benefits and costs are not possible. However, the Commission believes that the benefit-cost analyses reported in this Appendix provide a useful indication of the relative sizes of total benefits and costs, and of the economic rationality of a vaccination or eradication program.

Benefits and costs of a vaccination and of an eradication program were calculated for each State and for Australia. In each case benefits and costs were calculated for a 30 year period, and a net present value calculated using a discount rate of 10 per cent.

A program of vaccination was assumed to hold prevalence at a given level. If vaccination were discontinued, prevalence would rise as would the costs of the disease. The benefits of vaccination were calculated as the difference between the costs of the disease with no vaccination and the costs with vaccination. It was assumed that with no vaccination the prevalence of the disease would rise over five years to a plateau of 24 per cent for dairy herds and 16 per cent for beef herds.

A program of eradication has been assumed to reduce prevalence from current levels to almost zero over ten years. It was assumed that an eradication program causes prevalence to fall rapidly in the first few years of the program and then much more slowly as prevalence approaches zero.

The production benefits of an eradication campaign were calculated as the difference between the costs to productivity of the disease at current levels of prevalence and the costs at the reduced prevalence. Hence, as eradication proceeds productivity benefits increase. The market benefits of an eradication campaign (retained export markets) were assumed to commence after ten years and remain unchanged for the remainder of the period considered.

All calculations were made at current prices. For the initial calculations, the age and size structure of both beef and dairy herds was assumed to be constant through time.

A brief description of the basis of the calculations used to assess each of the benefits and costs of both the vaccination and eradication program is provided below.

Benefits

Milk Production. Brucellosis infection brings about a reduction in milk production because the length of a lactation is shortened by early termination of a pregnancy. Also brucellosis infected cows suffer depressed milk production even after a normal calving. The value of lost milk production was calculated taking account of the level of prevalences of brucellosis, the average milk production per cow in each State, the marginal value at export of increased milk production (13 cents per gallon), and the average loss of milk production per infected cow.

Calf losses. Brucellosis infected cows have a higher probability of abortion or stillbirth than do non-infected cows. This probability is much higher for heifers than for animals in their second or successive calvings and is reduced markedly by vaccination. The total value of calf losses caused by brucellosis infection is dependent on the total number of female breeders in the national herd, the proportion of these which are heifers, the proportion of breeders which have been vaccinated, and the value of each calf. A value of \$10 for each calf lost has been used in the calculations.

Placentae retention costs. Brucellosis infection may cause the retention of the placentae (afterbirth). This in turn may render the animal either permanently or temporarily sterile. Placentae retention costs were calculated by assuming that 30 per cent of infected heifers retain their placenta. Of these, ten per cent become permanently sterile, 45 per cent do not calve for one season, and 45 per cent are unaffected. The cost for dairy cows was calculated at \$20 per infected breeder. This was an estimate of the veterinary costs incurred in having the retained placental membranes removed. For beef cows it was assumed that retained placentae would not be observed. The cost is therefore that involved in maintaining a cow for a non productive year and then, possibly, culling it. These costs are difficult to assess and a figure of \$20 per animal has been used.

Exports. The Commission believes that without eradication of brucellosis at least some dairy and beef export markets may be closed to Australia. The possible retention of these markets is a benefit of eradication. Export benefits were calculated as the revenue loss resulting from allocating products from those markets believed to be at risk to alternative markets. The calculation of export benefits is discussed in some detail in the text of this report.

Vaccination. An alternative to full-scale eradication would be a vaccination program provided that vaccination proved to be more profitable than its alternative, namely no action at all.

Table 1 shows estimated benefits and costs, in discounted net present values, associated with a 30 year vaccination program. The benefits of such a program depend in part upon the prevalence of brucellosis in the absence of vaccination. The study assumes that without vaccination the prevalence of brucellosis in beef and dairy herds would rise to 16 per cent and 24 per cent respectively. These percentages are estimates provided by Morris and Roe.

In the dairy industry the benefits of reduced prevalence through vaccination are an increase in milk production and improved fertility in cows. In the beef industry the main benefit is from increased fertility.

Vaccination costs total \$44 m. (\$6 m. for dairy and \$38 m. for beef cattle) which, compared with the benefits of vaccination, are quite small. The resulting benefit-cost ratio for the dairy industry is 8:1. For the beef industry, the benefit-cost ratio is the order of 2:1. For both industries the benefit-cost ratios of a vaccination program are favourable. Therefore a vaccination program as an alternative to an eradication program is preferable to no action at all.

Costs

Vaccination. Vaccination costs have been assessed for each state on the basis of cost information provided by State Governments. Vaccination costs include the costs of vaccine, salaries of veterinarians, and farmer costs of mustering and handling cattle. For dairy cattle which are mustered daily, only in-yard handling costs are included as a cost of a vaccination program. A simplified vaccination program involving vaccination of all young heifers with Strain 19 was assumed.

Farm testing. Farmer testing costs include the costs of mustering and handling cattle. Again, for dairy cattle only in-yard handling costs were included. It is assumed that three separate tests are required in an initial year with a fourth test a year later. Thereafter, testing costs were assumed to be dependent upon the level of herd prevalence.

Government testing. Government testing costs include the costs of sampling, laboratory testing (which includes a share of overheads), and administration. Unit costs have been based on information supplied by State

Governments. A testing program involves an initial four tests for every animal. Thereafter, total testing costs are a function of herd prevalence. (When a reactor is discovered by the trace back system the herd of origin is tested.)

Monitoring. The costs of a monitoring system include the cost of testing animals at the abattoir and a low level of field testing, as well as costs of administration, and information storage and retrieval. It has been assumed that all slaughtered adult breeders are tested at the abattoir in the initial years of an eradication program. When provisional freedom has been attained, the level of testing has been assumed to drop to ten per cent of adult breeders.

Compensation. Compensation costs were calculated assuming an average difference between the carcass value of an animal and the value of an equivalent, but brucellosis free, animal of \$50. Compensation costs in a particular year are dependent upon the level of prevalence.

TABLE 1 : BENEFITS AND COSTS OF A CONTINUING VACCINATION PROGRAM
(Discounted at 10% - accumulated over 30 years)
(\$'000)

	N.S.W.	VIC.	QLD.	S.A.	W.A.	TAS.	N.T.	AUST.
DAIRY								
Benefits:								
Milk production	3230	12879	2076	1313	886	1534	..	21918
Placentae	3410	8992	2740	1024	807	1089	..	18062
Calves	1445	4266	1130	478	423	533	..	8275
Total	8085	26137	5946	2815	2116	3156		48255
Costs:								
Vaccination	1115	3143	770	388	284	449	..	6149
Net benefit	6970	22994	5176	2427	1832	2707		42106
B/C ratio	7.25	8.32	7.72	7.26	7.45	7.03		7.85
BEEF								
Benefits:								
Placentae	17042	8154	19965	3290	4544	1447	3012	57454
Calves	7613	3667	8119	1479	1907	753	996	24534
Total	24655	11821	28084	4769	6451	2200	4008	81988
Costs:								
Vaccination	13273	5365	11960	2459	2195	1353	1359	37964
Net benefit	11382	6456	16124	2310	4256	847	2649	44024
B/C ratio	1.86	2.20	2.35	1.94	2.94	1.63	2.95	2.16
Public health	118	77	62	16	5	0	0	278

TABLE 2 : BENEFITS AND COSTS OF A TEST AND SLAUGHTER ERADICATION PROGRAM

(Discounted at 10% - accumulated over 30 years)

(\$'000)

	N.S.W.	VIC.	QLD.	S.A.	W.A.	TAS.	N.T.	AUST.
DAIRY								
Benefits:								
Milk	136	541	87	59	33	3	..	859
Placentae	524	1388	421	170	110	7	..	2620
Calves	61	179	48	22	15	1	..	326
Export	11481	39531	7149	4124	2337	4124	6	68752
Vaccination - farmer	390	1320	293	140	141	166	4	2454
- Government	725	1823	477	248	142	283	7	3705
Total	13317	44782	8475	4763	2778	4584	17	78716
Costs:								
Vaccination - farmer	144	411	102	49	39	0	0	745
- Government	271	763	186	95	67	0	0	1382
Testing	419	1513	478	177	141	191	..	2919
- Government	2861	6988	1319	833	246	100	..	12347
- monitoring	222	492	200	115	45	78	1	1153
Compensation	1038	2735	833	335	216	16	..	5173
Total	4955	12902	3118	1604	754	385	1	23719
Net Benefits	8362	31880	5357	3159	2024	4199	16	54997
B/C Ratio	2.69	3.47	2.72	2.97	3.68	11.91	17.00	3.32

TABLE 2 continued

	N.S.W.	VIC.	QLD.	S.A.	W.A.	TAS.	N.T.	AUST.
BEEF								
Benefits:								
Placentae	3405	1630	3990	710	7960	11	169	17875
Calves	441	213	472	92	97	2	16	1333
Export	151756	81298	195115	27099	43359	16260	27099	541986
Vaccination - farmer	4646	2254	4545	885	1097	501	448	14376
- Government	8627	3112	7416	1574	1098	852	911	23590
Total	168875	88507	211538	30360	53611	17626	28643	599160
Costs:								
Vaccination - farmer	1734	700	1561	320	288	0	0	4603
- Government	3218	1301	2898	598	531	0	0	8546
Testing	4332	2771	8169	1198	1746	532	1218	19966
- Government	18811	8404	12709	3527	1819	173	3953	49396
- monitoring	2288	2002	1385	445	552	282	165	7119
Compensation	6742	3223	7887	1399	1590	21	339	21201
Total	37125	18401	34609	7487	6526	1008	5675	110831
Net Benefits	131750	70106	176929	22873	47085	16618	22968	488329
B/C Ratio	4.55	4.81	6.11	4.06	8.21	17.49	5.05	5.41
Public Health								
Overall B/C Ratio	4.33	4.26	5.83	3.87	7.75	15.94	5.05	5.04

TABLE 3 : FUTURE COSTS OF ERADICATION BASED ON COMMISSION ESTIMATES
(Undiscounted)

(\$'000)

Year	FARMER			GOVERNMENT			
	Testing	Vaccination	Total	Testing	Vaccination	Total	
1	6,877	1,667	8,544	18,156	2,677	20,833	34,843
2	9,234	1,389	10,623	24,894	2,231	27,125	46,404
3	9,334	1,158	10,492	25,195	1,859	27,054	48,257
4	2,518	965	3,483	7,259	1,550	8,809	19,308
5	197	804	1,001	625	1,292	1,917	7,693
6	118	671	789	324	1,077	1,401	5,605
7	72	559	631	195	897	1,092	4,314
8	46	466	512	118	748	866	3,469
Eight year total	28,396	7,679	36,075	76,766	12,331	89,097	169,893
% of grand total	16.7	4.5	21.2	45.2	7.3	52.5	100.0
9	30	388	418	74	623	697	2,080
10	19	324	343	47	520	567	1,691

TABLE 4 : FUTURE COSTS OF ERADICATION BASED ON STATE PROJECTIONS

(Undiscounted)
(\$'000)

Year	FARMER			GOVERNMENT			Compensation	Monitoring ¹	Total
	Testing	Vaccination	Total	Testing	Vaccination	Total			
1	1411	690	2101	4329	1125	5454	1610	710	9875
2	2134	807	2941	6926	1316	8242	5559	1015	17757
3	2197	633	2830	7200	1033	8233	7620	1320	20003
4	2200	563	2763	7118	918	8036	6490	1320	18609
5	2199	469	2668	7118	765	7883	6491	1320	18362
6	2197	391	2588	7132	637	7769	6491	1320	18168
7	2198	326	2524	7137	531	7668	6491	1320	18003
8	2013	272	2285	6423	443	6866	6331	1320	16802
9	1443	226	1669	4004	369	4373	4911	1320	12273
TOTAL	1211	189	1400	3384	307	3691	3606	1320	10017
	19203	4566	23769	60771	7444	68215	55600	12285	159869
% OF GRAND TOTAL	12.0	2.9	14.9	38.0	4.7	42.7	34.8	7.7	100.0

1 Commission estimate. No estimates given by States.



